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A

BRIEF PRACTICAL TREATISE

ON THE

CONSTRUCTION AND MANAGEMENT

OF

PLANK ROADS,

BY

ROBERT DALE OWEN.

WITH AN APPENDIX CONTAINING THE GENERAL PLANK ROAD LAWS OF NEW
YORK, KENTUCKY, INDIANA AND ILLINOIS, AND THE AMENDMENTS
THERE TO UP TO THE SESSION OF 1849-50. ALSO, THE
OPINION OF JUDGE GRIDLEY OF THE NEW YORK
SUPREME COURT IN THE CASE OF BEN-
EDICT VS. GOIT.

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INTRODUCTION.

THE circumstances which gave rise to, and furnished materials for, the present Treatise, are as follows :

In September last a Company was organized, under the General Plank Road Law of the State of Indiana, for the construction of a Plank Road in Posey County ; namely from New Harmony on the Wabash, to Mount Vernon on the Ohio ; a distance of fifteen miles. Of this Company I was elected one of the Directors. At the first meeting of the Board, as we found ourselves uninformed in regard to many practical details connected with the construction and management of a species of improvement, still novel in our State, a resolution was passed, requesting me, on behalf of the Company, to visit that portion of Western New York where Plank Roads were first introduced into this country, for the purpose of procuring the necessary information.

I spent several weeks in this excursion and succeeded in its objects in a very satisfactory manner ; having been fortunate enough to meet with old Congressional acquaintances, some of whom had been engaged in the practical construction of Plank Roads, while from others I procured an introduction to the original projectors and managers of the first Plank Roads built in the Union ; and these gentlemen, in the most liberal and obliging manner, communicated to me every information I could desire.

I visited Cazenovia, Chittenango, Oneida Lake, Syra-

cuse, Rome and Utica ; at all which places I had opportunity to converse with those who were more or less connected with such roads ; as well with the Presidents and other officers of Plank Road Companies, as with men who had been extensively engaged in their practical construction. I saw a number of different plank roads, some in progress of construction and one already requiring the renewal of its superstructure : and obtained many plans, estimates and specifications.

My visit and its object having become known, I had frequent applications for information. One or two brief articles which, in reply, I published in the newspapers, only invited further questions and more numerous and minute enquiries. And at last, although conscious that I had accumulated but scanty material for a treatise on this subject, I found myself in the position, either, with apparent churlishness, to refuse reply to communications that had become too numerous for private correspondence ; or to refer my correspondents and the public to a brief volume, which should embody the information, such as it was, that I had obtained.

I determined on the latter course. How imperfect soever my little work, it will doubtless convey to many, on a subject so new and little known, details and suggestions of practical value ; information which may induce many who are to benefit by these roads to urge forward and aid their extension ; information, too, by which thousands of dollars may be saved to those who undertake their construction. I know of one road, at least, in this State, which for lack of the requisite knowledge, has cost nearly, if not quite, twice as much as would have sufficed, under proper management, to complete it ; and will be found, even at such a cost, imperfectly and unsuitable constructed.

Experience in regard to the construction of such roads is daily and rapidly accumulating ; in our own State alone it is supposed that four hundred miles will be completed this season. The result will doubtless be, great improvement in the details of their construction ; and probably considerable modification of many of the recommendations here given. I shall esteem it a favor, if Acting Commissioners, or others, practically engaged in plank road making, will communicate to me the result of any experiments which show an improvement on the plans of construction laid down in the following pages.

R. D. O.

NEW HARMONY, Indiana, March 1, 1850.

TREATISE ON PLANK ROADS.

CHAPTER I.

EFFECTS FROM IMPROVED ROADS.

It may be confidently asserted, that, in our Western country, there is not one man in fifty who has ever sat down to make a deliberate calculation of what may be gained to the residents of a country by improved roads, or what is daily lost, among us, for lack of them. In other words, few men have made an estimate as to what amount of toll they might profitably pay, in order to obtain any given increased power of draught, on our ordinary thoroughfares. Say, that two stout horses can, under ordinary circumstances and in the average condition of our common country roads, draw one ton at a load ; and suppose, that, by any given plan, the surface of these roads becomes so much improved, that the same horses, with equal exertion, can draw three tons at a load, what amount of toll per mile can a teamster profitably afford to pay, in order thus to increase three fold the power of his team ?

The answer to this question, depending upon the present usual rate of transportation by wagon, will vary somewhat in different neighborhoods. The rate from the town in which I live to Mount Vernon, our county seat on the Ohio, fifteen miles distant, is more usually twenty cents per hundred pounds than fifteen ; and sometimes twenty-five cents. Put it, however, at fifteen cents ; or *one cent*

per hundred pounds per mile ; which is probably as low as the usual rate of hauling, take the summer and winter through, over the State of Indiana.

If, then, the power of draught is trebled ; or, in other words, if, by the same time and labor of man and horses which now convey one hundred pounds along the road, three hundred pounds can be conveyed ; then the gain, for every hundred pounds of the original load, is two hundred pounds, or two cents per mile. On the entire load of one ton (nett, of 2,000 lbs.) the gain would be twenty times that amount, or *forty cents per mile*.

It follows, that, if we suppose a wagon always fully loaded, and its owner paid for all the loads he hauled in cash, at the rate of one cent per hundred per mile, he would neither gain nor lose by paying a toll of *forty cents per mile*, for a two horse wagon.

In practice, indeed, this calculation would not hold out. A wagon is often but partially loaded, and frequently returns empty. And in hauling firewood or farm produce, a farmer, employing his team during leisure days only, does not rate hauling so high as a cent per hundred per mile. Perhaps half the amount, or twenty cents per two horse wagon per mile, might be a reasonable, practical estimate. If it were but one fourth, however, or ten cents, the result is amply sufficient for the present argument. This is no fanciful theory. It is a very plain and simple estimate which any farmer or teamster, sitting down by his fireside, may verify, with his pencil, in five minutes. If I have not put the rate of hauling too high, the deduction can no more be denied, than we can deny, that two and two make four.

Now, I am about to set forth, in the following chapters, the details of construction by which roads, partially cover-

ed with plank, can be made throughout our State, or any other State where timber can be readily procured; which roads shall enable every man who travels them to convey, on the average, by wagon or otherwise, at least three times as much as he now does, with any given horse power. And I am about to show, that instead of exacting a toll of *twenty* cents per mile for a two horse team, on these improved roads, a toll of *two* cents per mile, the highest allowed here by law, will, on any moderately travelled line of road, pay to the owners of the road a handsome per centage on their investment.

In travelling on such roads, when a wagoner, *fully loaded*, passes, every five miles, through a toll-gate, and pays at each, for his two horse team, one dime toll, he is paying for that which, for the time and at present rates, is actually worth to him *two dollars*; for if the toll-gate had not been there and the road had remained in its ordinary state, he would have charged (at the rate of one cent per hundred pounds per mile) two dollars for conveying four thousand pounds five miles; which four thousand pounds, in addition to his ordinary load, he is now hauling along that five miles without any increased power or any additional cost, save only this ten cents of toll. In paying ten cents toll, then, he may be regarded as a gainer of one dollar and ninety cents for every five miles he travels; and he would actually gain it, if he had always a full load and if rates of transportation remained unchanged. Let rates vary as they will, it is a gain to some one.

If, to any one, such a result seem incredible, I ask him to take pen in hand and disprove it—if he can.

If he cannot; if plain, truthful figures lead inevitably to such a result, then it must be conceded, that roads thus

improved, at such a rate of toll, are a national blessing, of which it would be difficult to estimate the pecuniary advantages.

The mere diminution of the rates of hauling, disconnected from other results, is the least portion of these advantages.

There lives, on the line of such an improved road now in progress of construction from New Harmony to Mount Vernon and about midway of the distance, a prosperous farmer named Wilson. He owns a thousand acres of land, on both sides of the road; of which land about a hundred and fifty acres are cleared and under cultivation, while the remaining eight hundred and fifty acres, rich and heavily timbered, are still in a state of nature, and are, to the owner, a source of no revenue and of continued taxation.

Why does Mr. Wilson not sell cordwood from his timbered land and thus obtain the means of clearing and making it productive? Because his nearest available market is Mount Vernon, more than seven miles distant, and it will not pay to haul wood thither, on the present road, as will readily appear by comparing rates and prices. Cordwood for family use is worth, in Mount Vernon, a dollar and a half a cord, steamboat wood rating somewhat higher. Mr. Wilson is satisfied if his four horse team, at leisure times, earns two dollars and a half a day; and, in long summer days, he can make two trips to Mount Vernon, conveying one cord of seasoned wood each trip. To chop this wood costs about forty cents a cord. The day's work, then, would stand thus:

Labor of team and teamster	-	-	-	\$2 50
Chopping two cords of wood at 40c.	-	-	-	80
Cost of 2 cords of wood delivered	-	-	-	\$3 30

But these two cords of wood would fetch three dollars only ; thus leaving a daily loss by the operation, of thirty cents. Of course Mr. Wilson hauls no cordwood to Mt. Vernon.

But now, let us see how the account will stand when the improved road, trebling the power of draught and taxed with tolls, is completed. Mr. Wilson can then, with four horses, on a properly constructed wagon with spacious wagon-bed and broad tires, as easily haul three cords of seasoned wood, as now he can haul one, and his two trips can be made at all seasons and in considerably shorter time than at present. Each day, then, a single four horse team can deliver six cords, at a cost as follows :

Labor of team and teamster, as before	-	-	\$2 50
Chopping 6 cords at 40c.	-	-	2 40
Tolls, 30 miles, at 3 cents per mile	-	-	90

Cost of 6 cords of wood delivered	-	-	\$5 80
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These six cords would bring nine dollars ; leaving a daily profit of three dollars and twenty cents ; more than fifty cents a cord.

As, however, the cost of hauling the wood from the spot where it is cut *to* the line of plank road should be added, and there must always be allowance for contingencies, I deduct twenty cents and say *thirty cents* only a cord.

Now, let us examine the results. While the old road, without toll-gates, was the only medium of transportation, Mr. Wilson's cordwood, as an article of commerce, was worthless. In point of fact, if he desired to clear his land, it was a negative quantity, worth less than nothing ; or, in other words, a source of expense, since it would cost something to roll the logs in heaps and burn them out of

the way. But as soon as the improved taxed road is opened, this same worthless incumbrance becomes, at once, of so much value, that it will pay, twice over, for clearing and fencing the land on which it stands. For if we put the number of cords of wood to the acre, reserving rail-timber, at seventy-five (a low estimate* on beech and sugar-tree land as thickly timbered as that of which I speak) these, at thirty cents a cord, would be worth twenty-two dollars and a half an acre; and half that amount, the cord-wood being out of the way, would not only clear and fence the land but also erect ordinary farm buildings on it.

What would Mr. Wilson have thought of it, if some one had proffered to clear and fence, ready for cultivation, say two hundred acres of his woodland, and to pay him two thousand dollars for the privilege of so doing? He would have deemed such an offer little short of madness, or a miracle in his favor. Yet just such a miracle is actually wrought, in his favor, provided he has energy and enterprise to profit by the road which will soon run past his door.

If he avail himself of its facilities, what will be the probable consequences, to himself and to the country?

Let us suppose, that he keeps two four-horse teams regularly running between his farm and Mount Vernon, conveying thither twelve cords of wood a day. To chop and haul this wood he must employ regularly ten or twelve hands.

*Good upland, well timbered, will usually average as much as this, if it be carefully managed and if part of the cord-wood be for family use. A neighbor of mine who has experience in such matters, having cleared a large number of acres on the Ohio, informs me, that he obtained, on the average, 42 cords of *steamboat* wood to the acre, and had left nearly as much more suitable for family use. But the ordinary Ohio bottom lands do not furnish as much cord-wood, probably by a third, as good beech and sugar-tree land.

Here, then, we have a mere improvement in a road, creating permanent employment and giving birth to a lucrative business ; furnishing a livelihood to eight or ten additional laborers on a single farm, and returning to the owner of that farm a clear profit, from this newly created business, of seven or eight hundred dollars annually.

But the benefit to the country does not stop here. The land which would have remained timber-clothed and untenanted except by beast and bird, is opened into farms and occupied by busy settlers.

Here we have all the elements of national prosperity. Remunerating employment supplied ; profit-bringing business called into existence ; forest lands reclaimed ; real estate made valuable ; the productions of the earth increased, both in quantity and in value.

There is another point in the case well worthy of remark. The improved road creates its own business. If it had never been made, Mr. Wilson's cord-wood would have remained in the tree, and his teams would not have started. It will be the new road that starts them. But these teams will pay to the stockholders of that road a dollar and eighty cents per day ; or say five hundred and fifty dollars a year. This is the interest, at six per cent, on upwards of nine thousand dollars ; or more than half the amount which the improved road from Mr. Wilson's farm to Mount Vernon will cost, all expenses whatever included.

And then there are the farms which, as we have seen, the road enables Mr. Wilson profitably to clear. The occupiers of these farms will have their teams, and their corn and wheat and other produce to be sent to market. Here again the road is creating and increasing its own business.

I have followed out this example, in its details, because similar results will be found along the line of all such improved roads, varying in degree of advantage according to distance from market, to prices and to the precise character of surplus production.

In practice it has been uniformly found, that such roads immediately and rapidly augment the amount of travel. Mr. Alvord, of Salina, N. Y., under whose superintendence the first plank road ever built in the United States was completed, and to whom I am indebted for much valuable information on this subject, told me, that, previously to the commencement of that road, it was deemed prudent to station men on different days and at different points along it, to ascertain the average number of teams that passed each day. The number proved to be seventy-five. This was in the year 1845. In the month of July, 1846, the road was completed, namely from Central Square to Syracuse, or rather to Salina, noted for its extensive salt-works, where its southern terminus is; and similar observations being repeated in the summer of 1847, the average daily number of teams was found to have increased to two hundred and fifty. In other words, *in one year after the opening of the plank road, the travel had more than trebled.*

I asked Mr. Alvord how, without a great increase of population by emigration or otherwise, this rapid increase of travel, could be explained. "It is easily accounted for," was his reply. "The chief transportation over our road, is of empty salt barrels for the Salina works. The country north of us furnishes excellent timber for cooperage. Previously to the building of our plank road, these barrels came in, on the old road, from a distance of six, seven or eight miles, for that was as far as it would pay to bring them; forty or fifty barrels being, in the average

state of the road, a load for two horses. Now, they are brought from a distance of fifteen or twenty miles; the business of cooperage has spread over a large tract of country not hitherto employed in it; and I have frequently counted a hundred and fifty barrels piled on a two-horse wagon."

The Syracuse and Central Square Plank Road had thus, in a single year, created a new business, equal to double that which existed along the same line, while the medium of transportation was a common earth road only.*

If the chief staple on the Salina road, instead of being salt barrels, had been corn or pork or hay or shingles or any other article, whether of farm produce or of manufacture, the principle would equally have applied, and the result would have been similar.

There are some cases in which it is a very easy thing to prophecy, and the progress of plank roads is one. These roads are as certain to become universal in Indiana and other forest-covered States, as men are certain, when the choice between one dollar and five dollars is offered to them, to select the latter.

The simple reason is, that, if they are properly constructed along any of our principal State or county roads, all parties concerned are gainers. The farmer or teamster pays two cents per mile for the privilege of adding four thousand pounds to a two horse load and still drawing it as easily and rapidly as before; and that privilege is worth five or ten times what he pays for it. Then there is the gain to the owner of land. I would give Mr. Wilson five dollars an acre more for his land with a plank

*Mr. Alvord further informed me, that the average time employed on a trip on the plank road was not more than two-thirds of what it had been, for the same distance, on the old road.

road running through it and connecting it with Mount Vernon, than I would without it; and for a very sufficient reason. I could make with the privilege of the plank road, ten dollars an acre additional profit from it, beyond what could be realised, so long as the present unimproved road is its only medium of communication with the Ohio river.

But if we estimate the average increase in the value of lands along a plank road, to be, for each acre within one mile of the road, one dollar only; for each acre within two miles of the road fifty cents; and for each acre within three miles of the road, twenty-five cents; then the total increase, amounting to two thousand two hundred and forty dollars for each mile of road, would more than suffice, under ordinary circumstances, to pay the entire cost of construction. Thus, if the building any line of plank road increased the value of lands within three miles on each side of it, at the above rates, the owners of the land could afford to complete it and open it to the public, though it never returned them a cent in the way of dividends.

But it is easy to show, and experience has proved it, that, at the usual cost of such roads, an amount of daily travel, equal, on the average, to *from ten to twelve two horse teams*, each way, will pay a dividend of six per cent over all current expenses. As to the renewal of the superstructure, the increase of travel may, in every case, safely be trusted to overpay that. The detailed estimates necessary to substantiate the above calculation are given in a subsequent chapter.

I repeat it, a species of enterprise thus eminently advantageous both to its stockholders and to the public must spread, with rapid strides, wherever material can, at reasonable price, be obtained. In the soil of the deep, allu-

vial forest lands of this and of our neighboring States there lies buried in rich profusion, as surely as in the sands of the Sacramento, if not gold, gold's equivalent. It is so troublesome and expensive, with no better facilities than our present wretched roads afford, to sift and coin this home gold, that many prefer the dangers of the Plains or the Isthmus, and seek on the distant shores of the Pacific the wealth which a little judicious enterprise would place within their reach at home. Show clearly, at first by careful estimate, afterwards by actual experience, that the home gold is to be had; and the same money-seeking enterprise which is now building up San Francisco into the metropolis of half a continent, will go zealously to work to construct that home-gold-sifter, the plank road.

If Mr. Wilson had found, on his farm, a gold mine for which he was offered five thousand dollars, the rumor of his good fortune would have rung all over the land. The plank road is, to him, quite as advantageous as such a mine. It renders timber that was comparatively valueless worth ten or twenty dollars an acre. It increases, by much more than five thousand dollars, the intrinsic value of his farm.

And so of other men, and other articles of produce, wherever a plank road passes or nears them. Whether a farmer adds five hundred dollars, yearly, to his income, by washing sand out of some gold-bearing creek that crosses his meadows, or whether it comes to him in the shape of increased value of corn or wheat or pork or timber, or of a stone-quarry perhaps, which, till then, would not have repaid the cost of opening it, what difference, except in fancy and in name?

There is one effect produced by all improved roads, whether plank or railways, which is well worthy of note.

They tend to equalize the value of land. Why does a farm three miles from a flourishing town sell, perhaps, for twice as much per acre as a farm of land equally good but nine miles distant? Because the cost of transporting produce to its usual market, is three times as much from the one farm as from the other. If you construct an improvement passing both farms, whereby the cost of transportation is reduced to one-third its present rate, the effect is to give to the distant farm the advantage of six miles transportation saved, or in other words, to bring it six miles nearer to market; while the effect to the nearer farm is that of approaching it two miles only closer to market. They are placed, therefore, much more nearly on an equality; and, as a necessary consequence, their monied value becomes more nearly equal.

Time was, when the daily marketing of cities was supplied, almost exclusively, by market-gardeners, living but a few miles from the corporation line, on land which owed its high value to the species of monopoly it enjoyed. Now, half a State comes into successful competition with them. I recently drank, in my coffee, at a friend's breakfast table in New York, milk which had been, that same morning at four o'clock, milked on a farm seventy miles distant. The railway which conveyed it to the city, tended to equalize the value of land, as between that farm and the dairy-farms of Long Island. Its effect, like that of all other improved roads, tended to the equalization of the value of property, to the extension of free competition and to the suppression of exclusive privilege.

Against railways the objection has been urged, that the farmer's wagon, at leisure times, is not available, in connection with such an improvement. The objection is undoubtedly valid, as far as it goes; though counterbalanced,

on important lines of transportation, by the speed and the power of the locomotive. This objection does not lie against the plank road. It is the farmer's railroad, prepared to receive his own wagons and teams, if the former be but stout enough to bear up under the loads it enables him to draw over its graded and improved surface.

It will never supersede the iron railway and the steam-drawn car. Each of these improvements has its appropriate sphere; the railway as a great, leading thoroughfare, terminating in cities and connecting distant sections of country; the plank road to afford communication between smaller towns and villages, to form neighborhood and cross-roads, often at right angles to a railroad line, supplemental to it, and terminating at its stations.

Plank roads first sprung up and became profitable among us, in the immediate vicinity of railroads. Those which I saw in Western New York were chiefly tributary to the Buffalo and Albany railroad, their general direction being usually north and south.

The success of plank roads in the State of New York, and the estimation in which they are there held, may be judged from the fact, that although the first plank road ever constructed in the United States, to-wit that from Syracuse to Central Square, was opened only about three years and a half ago, yet, at this moment, upwards of *two thousand* miles of plank road are in operation or in progress of construction, in that State alone.* I made special enquiry as to the dividends declared on these roads, and could not hear of one, in full operation, that paid less than ten per

*See recent report of the Secretary of State of New York, in which we are informed, that there are articles of association filed in his office contemplating the construction of more than 2,000 miles of plank road, and involving the expenditure of more than *three millions* of dollars.

cent. over expenses. Among so many, however, some, doubtless, will prove unprofitable; and this I the rather anticipate, because I noticed, occasionally, much carelessness in construction.

These roads are universally held, so far as I had opportunity of judging, in high estimation by the farmers.

I drove out on the Syracuse road two miles, to the first toll-gate, where nearly five thousand dollars a year are taken in; and had some conversation with the gate-keeper. I found a common country road coming in, at right angles to the plank road, just at the gate house. And wagoners coming in by this cross-road had the choice; either to pass through the gate, paying toll and taking the plank road, two miles, to Syracuse; or else to take a common earth road leading to the city, running nearly parallel to the plank road and nowhere more than forty or fifty rods distant from it. This earth road seemed in fair order, though, I observed, somewhat grown up with grass; and I asked the toll-gate keeper what portion of the wagons coming along the cross-road paid toll and took the plank road, and what proportion took the free road, to Syracuse. His reply was, that, in muddy weather, hardly a single wagon turned into the earth road; but that in fine, dry weather, the proportion, as he had satisfied himself by keeping count on several different days, was, that one in every seven or eight wagons took the free road, and the rest passed through the toll gate and on the plank. Yet this was no fair criterion whereby to judge the respective degrees of favor of the two roads; for the teams coming along the earth road, say with a ton each, paid the same toll for that single ton as if they had been loaded expressly for the plank road, perhaps with three tons apiece.

To every thing novel objections will be raised; and of course to plank roads. The objection most popular and

most usually urged, especially where the right of way over an old road has been demanded, is, that it is converting a road that has ever been free to all, into a taxed road for the benefit of a Company.

Let us examine, in another chapter, this question of free and taxed roads.

CHAPTER II.

FREE AND TAXED ROADS.

The old Indian *trace* is a free road. So is a cow-path from farm to farm. In like manner, a private wood-road whereon to haul rails to a field, or firewood to a dwelling, is, after it is once chopped out, a free road, until trees fall across it, or dead branches drop upon it; and it is thus blocked up, requiring a tax, in the shape either of labor or money, to open it afresh.

But to talk of any of our ordinary State or County roads, even after the original cost of opening them through the forest is paid, being free roads, is an abuse of terms. They are, from the necessity of the case, taxed roads; roads taxed sometimes very heavily; and always, as the road-law of this State and of most other States now stands, very unjustly.

There must be expended upon them, year after year, money, or labor which is money's equivalent, not to keep them in good order—for that they very rarely are, even in summer, and, in the winter months, never—but to keep them passable. And this word *passable* must be very liberally construed, to apply in the case. The road hence

to Mount Vernon, *can* be travelled at this moment; and is, therefore, in strictness, passable; for I travelled it, in company with a friend, the other day. To convey us and two small trunks across, required four active horses; and they sunk, literally to their girths, in the frequent mud-holes. There were no toll-gates on it, it is true; but each of us, in addition to the annual highway tax we pay to keep this road in repair, paid, on this particular occasion, a toll of two dollars; that is, upwards of thirteen cents a mile. Our fare, for fifteen miles, was three dollars each; and the charge was moderate; for the trip to and fro was a hard two days' job for a four horse stage. A two horse stage would have done it, with much greater ease on the plank road, in a single day; and the charge would not have exceeded one dollar apiece. The difference, two dollars to each of us, was a tax imposed for lack of a plank road. That was a fair amount of toll to pay on one hundred miles of a perfectly good road; a plank road, for example, on which a carriage could travel, summer or winter, at the rate of ten miles an hour: but to pay it on fifteen miles of road, for the privilege of wading, at the rate of three miles an hour, through mud under which our wheel-hubs were continually disappearing, was neither pleasant nor profitable.

I beg it may be understood, however, that I do not instance this as a case of uncommon hardship, or a tax of unusual amount. Last winter, the inhabitants of McLeansboro, a small town in Southern Illinois, some forty or fifty miles northwest of Shawneetown, found themselves, in consequence of the miserable condition of the roads around them, cut off from all supplies and thus deprived of coffee, sugar and other necessities of life. Tempting offers were made to several teamsters, but none

of them would stir from home. At last, a farmer of the neighborhood declared, that he had a team of four horses which no mud could daunt, and that he would risk a trip to Shawneetown, and bring back the necessary supplies. Ten days elapsed, and his empty wagon was slowly and painfully dragged into town by two drooping and jaded horses, scarcely to be recognized as part of the fresh and spirited team that started on this expedition. Their owner, by great exertions, had reached Shawneetown, where he took in about half a load. Two of his horses were killed in the attempt to return; his load was left perforce on the road, and the surviving horses were so worn down by the trip as to be unfit for use during the rest of the winter.

The tax, in this case, was a severe one; considerably exceeding a hundred dollars for the trip. But a hundred dollars ought to pay toll on a wagon loaded with three tons and travelling over the very best road, for five thousand miles; and that is more than one fifth of the distance around the world.

Nor let any one imagine, even setting aside such incidental toll as the above, that this horse-killing Shawneetown road is, in any sense, a free one. Its tolls are not, indeed, collected in gatehouses, a dime at a time. But the farmer is called from his half-ploughed field, and the mechanic from his workshop, to expend so many days labor upon it; and the land-owner pays toll thereon in the shape of a percentage on his property.

It can never be a question, whether our highways shall be free or taxed, for no roads will keep themselves in order. The sole question is, upon what principle shall they be taxed? Toll must be exacted from some one; either from those who travel them, or from those who do not

I think the just principle, in this as in other cases, is, that those who use a thing should pay to keep it in order. Our road-law makers, however, seem to have been of a different opinion. A man may drive wagon or ride horse, in the course of a year, many thousand miles over the roads of a county; he may be the owner of a daily stage which cuts them up as much as the transportation from a dozen farms; and yet our present law does not require him to contribute any heavier toll to defray road expenses and repair the great wear and tear he occasions, than the farm-laborer, earning his eight dollars a month, the owner of neither team nor saddle-horse, and who travels the roads, when he travels them at all, on foot.

I do not recommend that toll-gates should be erected on our county and state roads; but the reason is, not because the principle of road-toll is unfair—it is the only fair principle—but because the expense of toll-gates, on roads so little improved as ours, would not be warranted. It must be regarded as an excellent feature in the plank road system, that it enables us, so far as that species of improvement is carried out, to replace an unjust by a just mode of taxation.

The present road-tax system, of personal service and commutation, though it exists, under varying modifications, in almost all the States of the Union, very much resembles, as a recent writer on Roads has remarked, a remnant of feudal vassalage, when one of the tenures by which land was held was the obligation to make the roads passable for the lord of the manor. In the first settlement of a frontier country, some such system almost naturally suggests itself. But we have outlived its necessity, and are suffering grievously from its imperfections. If half the amount now exacted in labor were collected in money

and expended, in each district, under the direction of a practical road-maker, the burden would be much less and the roads much better. And if this money-tax were collected chiefly from land, of which the value is increased by the improvement of roads, it would be a much more equitable assessment, than if levied, as many road-laws permit, in the shape of a poll-tax on each adult male inhabitant.

But the whole system is radically inequitable, so long as the road-travellers are not reached; so long as those who chiefly wear out the roads do not chiefly pay for that highway labor of which they reap the benefit and have caused the necessity.

I would not have it imagined, that I regard the present system of toll-free roads, as specially favoring the traveller. I considered it no special favor, on my recent trip from Mount Vernon, to have the privilege of paying two dollars extra to the stage-driver, and saving fifteen cents in the shape of toll. That unlucky wight who lost two good horses on the Shawneetown road was not specially favored on the trip, though no toll-bar crossed his way. The bill paid to the blacksmith or the wagon-maker or the sadler, for repairing an axle-tree that was broken in a rut, or renewing a pair of wheels racked to pieces over frozen clods, or mending a set of harness which had proved insufficient to withstand the jerk out of a mud-hole—to say nothing of delays and vexation and absolute stoppage of business after a week's wet weather—loss of temper finding vent in oaths and blows showered on exhausted cattle, loss of cash by half and quarter loads—all these and fifty similar losses and expenses are not the less surely toll exacted on the road, though no agent of a road company collects it, from the step of his gate-house.

No road system, based on day's labor, will make the roads free; for, as a general rule, no such system will make them good: and bad roads never can be, in any just sense of the term, free roads. They are, in fact, a source of grievous tax; of tax sometimes so grievous, that it swallows up all the profits of the richest land, or causes it to lie, for long years, unpurchased, even at government price. They are a prolific source of poverty, a daily temptation to careless waste, the ban of thrift and the grave of enterprise.

In some counties a prejudice will be found to exist against the grant, by the County Commissioners,* of the right of way over any State or county road, when the same is requested for a plank road; and that prejudice will enrench itself behind the argument, that a public highway, which has ever been, since the first settlement of the county, free and open to all,—a road which is the result of the labor of the present residents and their fathers before them—should not become the property, and be subjected to the control, and to the taxes, of a private company.

* "The directors may, with the consent of the Board of County Commissioners of the County, locate said road over any State or County road or other public highway; and thereupon such State or County road or other public highway, or such portion thereof as may be so occupied and appropriated shall be and become the property of said company for the purpose of making and maintaining said road and the gates and toll-houses thereon. And the Boards of County Commissioners of the several counties of this State are hereby authorized to give their consent to the appropriation and occupation of any such State or County road or other public highway, over and upon which any such company may locate any such road."—*General Plank Road Law of the State of Indiana*, Sec. 4.

Similar provisions are incorporated in the General Plank Road Laws of New York, Ohio, and Illinois.

All changes of a novel character require explanation before they can obtain favor. The County Commissioners ought not to be expected to grant the right of way, if public sentiment is opposed to it. It should be the care, then, of the friends of any plank road, in case difficulties as to the right of way present themselves, to call together public meetings, and find speakers who will explain, in a plain and business-like manner, the true state of the case. Such appeals, if made in a proper spirit and sustained by practical arguments, cannot fail of success. This course was resorted to in this county (Posey) where, for a time, much disinclination to the grant of way existed; and with so much effect, that, when, after a lapse of some weeks memorials were presented to the County Board for and against the cession of the State road to the Plank Road Company, ten names were found in favor of the grant for every one opposed to it.

This matter is well worth some trouble on the part of Plank Road Companies. The amount saved in cost of construction by locating a Plank Road along the line of an old road must vary much, according to circumstances: but I do not think it is usually less than from two to three hundred dollars per mile; often much more. If the new road has to be cut through woodland, the additional expense will exceed that amount; for heavy grubbing is worth upwards of three hundred dollars a mile. If, on the other hand, the road run through improved farms, the amount demanded for right of way by the owners may be considerable.

A little pains, however, duly taken, to enlighten public sentiment; a clear and distinct refutation of the popular error, that our present ill-made and profitless public highways are free, and that tolled roads only are taxed; a lucid

exposition of the true principle of road taxation; these will, in almost every case, suffice to convince the great majority of tax-payers, that it is both just and expedient to abandon to those who will effectually improve them, roads which we ourselves cannot profitably use as they are, nor under any moderate rate of taxation, make what they should be.

CHAPTER III.

ORIGIN OF PLANK ROADS.

Wood has been employed, in various forms, as a material for improving roads, in different countries. Wooden railways were used, in some of the English collieries, in the early part of the seventeenth century. Wooden pavements have been constructed both in Europe and in this country, usually of hexagonal blocks; but they have been found too expensive on an ordinary road, and too perishable to replace with advantage, in the crowded streets of a city, pavement of granite.

Our own "corduroy roads," formed of young trees or heavy rails, laid side by side, across wet portions of a highway, are well known to all western travellers. They are very valuable as a substitute for a swamp, very excusable in the first settlement of a country; but, as a permanent and habitual construction in a well settled neighborhood, they are an example of labor unprofitably expended, a disreputable evidence of indolence and lack of enterprise in the inhabitants.

No mode of employing wood as a material for roads,

has been so successful in practice, nor so profitable to all concerned, as the laying down of plank, from two to four inches thick, on a portion of the road; now usually made sufficiently wide for a single track only; sometimes with wooden turn-outs at intervals, to enable vehicles to pass each other; more frequently with an earth or gravel road, along side of the planked portion, sufficing for the same purpose.

This mode of employing wood in road construction is said to have originated in Russia. At all events, plank roads have been known there for many years. Their precise mode of construction, in that country, I have not been able to learn; but I conjecture, that they were made wider than eight feet, the usual and most approved width now among us. Certain it is, that when, at the instance of Lord Sydenham, who had seen them in Russia, and who afterwards, as Governor General of Canada, recommended their adoption, they were tried in this latter country, some of the roads, first constructed near Toronto, were made double-track, of plank sixteen feet long; and others, intended for single-track only, were yet made twelve feet in width. Whether, on the Russian roads, it was deemed necessary to fasten the plank down in any way, I know not; but in Canada the Board of Public Works directed that they should be nailed to the stringers or sleepers on which they rest with one spike at each end for planks twelve inches wide or less, and two at each end for planks of a greater width; the spikes to be six and a half inches long, three-eighths of an inch square with chisel-shaped edges and broad heads, and to be driven with the chisel-edge across the fibres of the wood.

Various experiments were also made in Canada, as to the best mode of laying the plank. On the first road lead-

ing from Quebec, they were laid lengthwise of the road, instead of across it; and on the Longueuil and Chambly road, in the vicinity of Montreal, they were laid obliquely, to-wit, at an angle of forty-five degrees to the line of the road. This latter plan renders necessary longer plank for any given width of road; twelve feet plank making an eight foot track only.

None of these experiments succeeded, and their trial and failure ought to be recorded, that we may not, as some in our State have done, try over again what is already exploded.

The attempt to construct a double track plank road by laying down plank sixteen feet long (usually on four stringers*) proved a complete failure. The *theory* was, that teams going from town should drive on the right hand eight feet of the road, and those returning should use the other eight feet. But this never happens. The tendency of travel, as all road-makers ought to know, is ever to the centre of the track. No rule set up at a toll-gate, nor any thing short of an actual division of the track, can make it otherwise. In practice it was found, that all teams occupied six or eight feet width only, in the centre, and that teamsters turned off on the sides, only when two teams met. The consequence was, that, after a time, plank of so great a length, continually loaded in the centre, sprang upwards at the ends, in spite of the spikes employed to fasten them. And so much inconvenience was experienced by the plank becoming thus loosened and unsettled, that they were finally cut in half, so as to form a sort of double track; and this expedient, imperfect as it was, proved to be an improvement on the original sixteen foot track.

*See Canadian Board of Works' specification, 1845.

So also on a twelve-foot Toronto road. When, after seven years wear, the plank (of pine) were taken up, they were found worn out in the centre of the road only, to the width of seven or eight feet, while on the surface of the two outer feet on each side, the marks of the saw were still plainly to be seen. This was proof, that one third of the planking was useless, and that one-third of the expenditure for plank had been wasted.

Again, on an eight-foot track, spiking down has been proved to be wholly unnecessary, if, in other respects, the road is properly constructed. The wheels run within eighteen inches of the outer edge of the track; and this and their own weight are found to keep them down effectually in their places.

As to the experiment of laying the plank lengthwise of the road, it was speedily abandoned. Loaded horses, travelling along the grain of the wood instead of across it, obtained no sufficient foothold, especially in wet weather; the plank wore into ruts; the wheels cut in between the separate plank and displaced them. In a word, the plan failed.

Nor did that of laying the planks at an oblique angle succeed much better. The idea was, that the edges of the plank would not wear down so rapidly as if the wheels struck them directly, and that the zigzag ends of the plank would facilitate getting from the earthroad to the plank track. But in practice it was found, that when a single wagon wheel came on one end of a plank thus laid askew, at a moment when the other wheel had not yet reached it, the effect was, to tilt up the other, unloaded end of the plank; and even if that was secured by spiking, gradually to loosen the spike and cause the plank to spring, notwithstanding. Each end of the plank is, in its turn, subjected

to this action, and thus the road is gradually broken up. So that project was abandoned, and the plank laid at right angles to the line of road.

One short Canadian road, instead of being laid, as is usual, on stringers or sleepers, was constructed without any; the ground being merely levelled off, and the plank laid down on it. I have not heard of but a single instance, and that in the State of New York, where the example was followed. And in both it is said to have resulted well. This may be, on a dry, hard, solid soil; on our rich and yielding alluvial bottoms I should certainly not advise to risk it. Nor is the saving such as to warrant much risk. Our stringers, on the Mount Vernon and New Harmony road, cost us but a hundred dollars per mile.

The system of plank roads, so far as regards details of construction, has been, like other improvements, considerably matured and perfected, since its naturalization in the United States. Its details vary, however, on different lines of road. I have endeavored to select from each, so far as my observations extended, what seemed best and most applicable, on our soil and in our climate; and present a sketch of the results, in the following pages.

CHAPTER IV.

LAYING OUT.

The early bridle-paths of this Western country, following the leading ridges, and connecting settlement with settlement, or conducting to the distant mill, were often laid

out with more judgment, than avenues of communication of later date and greater pretension, dignified with the name of State and County roads.

“The passion for straightness,” says an excellent modern writer on road-making,* “is the great fault in the location of most roads in this country, which too often remind us, how

“The King of France, with forty thousand men
Marched *up a hill* and then marched *down again*,”

“so generally do they clamber over hills which they could so much more easily have gone round; as if their makers, like Marshal Wade, had ‘formed the heroic determination of pursuing straight lines, and of defying nature and wheel-carriages both, at one valiant effort of courage and of science.’ ”

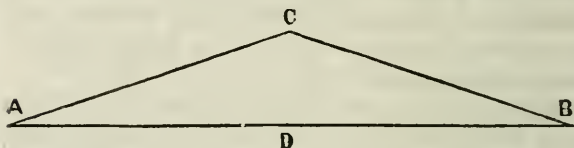
It is a rule recognized in engineering, that when a road cannot be made at the same time straight and level, straightness should always be sacrificed to obtain a level, or to make the road less steep. There is a point, of course, beyond which this principle must not be carried. As a general rule, it has been set down, that the horizontal length of a road may be advantageously increased, for the sake of avoiding an ascent, twenty times the perpendicular height to be saved thereby; or in other words that it is profitable to make a circuit that shall lengthen a road by a thousand feet, if by so doing we can escape a hill fifty feet high.

A case in point, occurred in locating the Mount Vernon Plank Road, which chiefly follows the old State road. At one point, the first trace followed by the early settlers had wound around the head of a small ravine, increasing the

*Gillespie.

distance about a hundred and fifty feet. Some blunderer, by way of improving the road, had subsequently straightened it, so as to cut across the ravine and incur a steep ascent of more than twenty feet. To avoid this ascent, one would have been justified in going around three times as far as the first settlers did. The road was, of course, restored to its original location.

In lengthening a road to avoid any obstacle, the distance is not increased so much as is usually supposed. Say that the direct line connecting two points, A and B, is twelve miles; and that it is desired to pass through a point C, midway of the distance, but aside from the direct line



and *two miles* distant therefrom, this may be effected without increasing the entire distance more than *two-thirds* of a mile. Sganzin* calculates, that if a road between two places ten miles apart were made to curve so that the eye could in no part of it see further than a quarter of a mile at once, its length would be increased beyond that of a perfectly straight road between the same points, one hundred and fifty yards only.

It is to be remembered, also, that in descending into a ravine and then ascending out of it, or in ascending a hill and descending it on the other side to the same level from which we started, we are diverging from a straight airline, as surely, as if we suffered our course to be diverted to the right or left, in order, by a circuit, to avoid the hill or the

*Course of Civil Engineering, Boston, 1837.

ravine altogether. It is true the divergence is very rarely as great in the one case as the other; a hill must be somewhat in the form of a half globe to make it so: yet it is often no inconsiderable item, and should in all cases, be taken into account.

Sometimes, at a moderate expense for excavation and embankment, by crossing a ravine or surmounting a hill, at easy grades, a considerable circuit may be profitably avoided. In what cases it may be expedient thus to purchase a straight line, and at what cost such a line may advantageously be carried over any given obstacle, are questions which must be left to the judgment of the Engineer or Locating Commissioner. In making up a decision, it should not be forgotten, that the annual repairs, per rod, on a road constructed on an artificial surface (as on an embankment or through an excavation) are considerably greater than on a road of equal breadth running on the natural surface.

In cases where, in descending a hill, we have a choice between its northern and southern slope, it is worth remembering, that a southern exposure always makes a road drier, more solid, more safe in winter, and less expensive of repair, than a northern one.

When there occurs, on any road, an embankment of considerable height and length, without any corresponding excavation near enough to supply earth for the same, (as, for example across a creek bottom that is occasionally overflowed) it may be often profitable to substitute for the same, on a line of road which will not bear heavy cost, a common trestle-bridge. Such a structure is, indeed, temporary; yet, if well made, of good white oak, even if uncovered, it will last twelve or fifteen years; and there is great saving in cost. A trestle-bridge on the Mount Ver-

non road, 260 feet long, 12 feet wide and averaging 15 feet high, cost but one dollar and forty-five cents per running foot, price of timber included; or, for the whole bridge about \$377 : while an embankment across the same bottom would have cost, including a stone culvert, some twelve or thirteen hundred dollars.

A little thought and judgment exerted in laying out a plank road, will often suggest, even to those who have not the advantage of professional experience, simple expedients by which considerable saving can be effected. In the case of the trestle-bridge above mentioned an example occurred. That bridge, raised about three feet above the highest water mark, was of convenient and suitable height at its southern extremity, adapting itself there to the level of the road; but at its northern end, it struck a hill, at a point to ascend from which, at the grade to which we were limited, would have required an average cutting of more than five feet for upwards of a quarter of a mile; and then, through the summit, a cutting of nearly ten feet for some twenty or thirty rods. To avoid such expense, the bridge, instead of being run on a level, as is usual, was constructed with an ascending grade of one foot in fifty; which can be done without difficulty or injury to the solidity of the structure: its northern extremity was thus raised about five feet; the cutting for a quarter of a mile was almost entirely saved, and the cutting through the summit diminished to less than five feet. The saving effected by this expedient amounted to several hundred dollars.

Again, in descending the principal hill on this road, near Harmony, to avoid a steep pitch of about one foot rise in ten, and after surveying several different routes, one was selected as the most favorable, upon which a gradual de-

scent of half a mile, averaging about one in thirty-seven, was obtained. In locating this line, at the above grade, the most expensive portion was found to be an excavation, near the centre of the descent, averaging nearly sixteen feet for upwards of one hundred yards and furnishing considerably more earth than was required for the adjoining embankments. To avoid so deep a cut, instead of running the grade of 1 in 37 down the entire hill, the upper portion was run with a grade averaging about 1 in 40, while on the lower half the grade was increased to about 1 in 34. In this way the deep cutting was reached at a point more than six feet higher than before; the excavation consequently decreased to an average of less than ten feet, and the excavation and embankment balanced. This was effected without exceeding the maximum grade (1 in 30); and it may be considered to have improved, rather than injured, the location of the road. Gillespie, speaking of what roads ought to be as to their slopes, says:

“If the ascent be one of great length, it will be advantageous to make steepest the lowest portion of it, upon which the horses come with their full strength, and to make the slopes greater towards the summit of the ascent, to correspond to the continually decreasing strength of the fatigued horses.”*

I select examples which to some may seem too simple and self-suggesting to merit record, because this treatise is strictly popular in its character, intended for those who know nothing, professionally, of engineering, and who may yet be called upon, unaided perhaps except by a county surveyor, to lay off new and possibly difficult lines of road.

*Roads and Railroads, p. 42.

A plank road, or indeed any improved road, ought to have no curves run with a radius of less than one hundred feet; especially when constructed on a steep hill-side. A carriage driven at speed around a more contracted curve than this, especially during ice, runs some risk of upsetting; and in case of horses running away, the danger becomes imminent.

To the unprofessional a few memoranda regarding the mode of tracing curves may be serviceable. By a calculation unnecessary to detail here, it will be found, that if we are running with stations of two rods, or 33 feet each, and if we deflect *one degree* at the end of each station, so as to make a curve, of which the chords are thus 33 feet in length, that curve has a radius of 1890 feet. Now this quantity, (of 1890) becomes a constant, by dividing which by any given number of degrees of curvation, the radius corresponding to that number of degrees may be found.

Thus, (always supposing the stations to be 33 feet each) if, at the end of each we deflect twenty degrees, the radius of the curve we are thus describing is 1890 divided by 20; or *ninety-four feet and a half*. If the deflection is about eighteen degrees and nine tenths, the curve will be of 100 feet. If the deflection be double that amount, the curve will have a radius of 50 feet only; and so on. It is to be remarked, however, that, in passing from a straight line to a curve (as that straight line is of the nature of a tangent, not of a chord, to the curve in question) the *first* deflection must be only half as great as at the end of each succeeding station.

Thus, in practice, if with stations of 33 feet, we desire to commence, from one end of a straight line of road, a curve of 100 foot radius, the first deflection must be of about nine degrees and forty-five hundredths; the next, at

the end of 33 feet further, of eighteen degrees and nine-tenths; and we must continue this same deflection of eighteen and nine-tenth degrees at the end of each succeeding 33 feet, so long as we desire to continue the curve.

I refrain from further enlarging on this and kindred branches of the subject, as they exceed the limit and scope of this brief treatise; and as no important plank road ought to be undertaken, without consulting good works on road-making, where the above and all other branches are treated at large. Gillespie's "Roads and Rail Roads" is one of the best.

Little engineering is commonly required in laying out plank roads. In New York they are usually laid down on the lines of old State roads, deviating from these only when the limit of grade fixed upon is exceeded. Where much of the line is new, however, and there is considerable embankment and excavation, an engineer's spirit-level, in the hands of some one who understands its use, is indispensable. It is also requisite, that whoever locates the road and sets the stakes for the contractor, preparatory to grading, should be able accurately to calculate quantities of excavation and embankment, in the various forms in which these usually occur.*

Under ordinary circumstances, it is a superfluous ex-

*The blundering method of calculating cubical contents by "averaging end-areas," though usual enough, should never be permitted. A company may be very considerable losers by allowing it, as it gives an excess, often of ten per cent. or more beyond the true amount; the error consisting in estimating the contents of sundry pyramidal masses, by multiplying their bases by *half* their heights, instead of by *one-third* their heights only, and thus making their cubical contents one-sixth greater than they really are. For a detailed exposition of this error and an explanation of the proper mode of calculating cubical contents in excavation or embankment, see the Appendix to Gillespie's work.

pense to engage the permanent services of a resident engineer, throughout the term of construction of a plank road, as is always necessarily done in constructing a railroad. The cost of the former improvement per mile, when compared with the latter, is so small, that it will not bear high salaries and other heavy incidental expenses. These soon run up to be a large per centage of the entire cost of the road, and thus materially influence the ultimate value of the stock. The cheapness of the plank road is one of its chief recommendations ; its construction, therefore, should, in every department, be managed with all reasonable economy.

It should, nevertheless, be borne in mind, that the services of a competent engineer, when really required, (as, to determine the relative cost of two or more proposed lines of road up an expensive hill, or to set the stakes for cutting and filling on the same, or to calculate with accuracy a heavy job of excavation and embankment) may often save their cost, many times over. In this, as in other matters, we ought to avoid running into either extreme, whether of profitless extravagance or of equally profitless parsimony.

In laying out plank roads, the limit of grade is a matter upon which much of their utility depends. This subject, and the laws which govern it, are of sufficient importance to occupy another chapter.

CHAPTER V.

GRADES.

The amount of power required to overcome the friction of any vehicle, or, in other words, the draught necessary to set and keep it in motion, is technically termed its *traction*. On a railroad the traction corresponds to the power exerted by the locomotive in dragging the train behind it. On a plank or macadamized road it is the force exerted by a horse against his collar in drawing any load. When we speak of a traction of fifty pounds, we mean a horizontal draught that would suffice to raise a weight of fifty pounds perpendicularly; for example, by passing a rope attached to the weight over a pulley, making it fast to the swingle-tree, and causing the horse to advance.

The *traction* on a perfectly level and well made railroad, with car wheels of the proper construction and in the best order, is usually set down at eight pounds to the ton (net, of 2,000 lbs.) In practice, however, it may be considered to be ten pounds. That is to say, on such a railroad it is usually found, that the same horizontal draught which would raise a weight of ten pounds perpendicularly, will keep in motion a car weighing one ton.

It is to be regretted, that no trustworthy experiments*

*The instrument employed in such experiments is called a *Dynamometer*, resembling in principle and general construction, the spring-balances in common use. The draught or horizontal force exerted by a horse or other motive power, compresses a spiral spring, the shortening of which, as indicated by a graduated scale, gives the amount of traction called forth. A full description of this instrument will be found in Parnell's "Treatise on Roads," London, 1838.

have yet been made to determine, with accuracy, the traction on Plank Roads. We have the data, however, whence to derive an approximating estimate. Gillespie gives the traction on a well made pavement at 31 pounds to the ton. A French writer, Poncelet, gives the traction on "oak planks not dressed" at 21 lbs. Another French writer gives the traction of carts on an "oaken platform" at less than 29 lbs., but of "trucks of two tons" on the same platform at nearly 44 lbs. Taking the average of various experiments, and correcting this by the opinion of those who have experience in the matter, I place the traction on a dead level plank road, well constructed of hard wood, the load being on a common four-wheeled wagon, with good iron axles, the wheels in good order and the pace being a walk, at *forty pounds* to the ton; or four times the traction on the best railroad. On a macadamized road, well made and in good order, the traction will exceed sixty pounds; while on our ordinary earth roads, take the average of the year, the traction may be set down at not less than *a hundred and twenty pounds*; or three times the traction on a plank road.

To express in different terms the same results, the traction on a level, is, on the plank road, *two per cent.* of the entire load; on a macadamized road, *more than three per cent.*; and on a common earth road *six per cent.* of the same.

Where the surface is perfectly level, then a horse at a walk, can, with the same exertion, draw, on a good plank road, three thousand pounds, as on the average of our present roads, he can draw one thousand pounds.

But where the surface varies from a level, then, (though

some writers seem inclined to a contrary opinion,*) the smoother the road, the greater the necessity for easy grades. If, on a plank road, the grades are left as steep as on many of our present highways they are, a great portion of the advantages of the improvement are lost. The truth of this assertion will more clearly appear, if we examine the principle of the matter.

The rule to estimate the increase of traction on ascending grades, is a very simple one. It is this: *for every foot rise in going one hundred feet, add, to the traction as estimated for a level, one per cent. of the entire load.*

For example: if a wagon, weighing with its load two thousand pounds, come to a hill, that rises with a slope of two feet in a hundred; and if the traction of that load, on a dead level, is sixty pounds; then, to find the traction on the hill, we must add two per cent of two thousand pounds; or forty pounds; making, with the above sixty pounds, a total of one hundred pounds.

Let us now observe, how, under this rule, the matter stands, in regard to grades, as between plank roads and unimproved earth roads. Suppose that two horses, on a well made plank road, draw three tons, or 6,000 lbs. On

*Geddes, a New York engineer, in a recent useful little tract on Plank Roads, says: "Hills are less objectionable on plank roads than they are on any other roads. The plank make a better surface than any other thing that has been tried; and the power required to draw a load up a hill is less on plank than on gravel or broken stone."

This last assertion is correct. The power required to draw up the *same* load is less. But that is not the practical question. The load to be drawn up, if it be a full one, is three times as great on the plank as on an ordinary road. And the increased power required to draw *such* a load up any given slope, bears a much greater proportion to the draught of the same load on a level, than does a similar increase on the lighter load drawn over an ordinary road, to *its* draught on a level.

this load, the traction, on a dead level, at 40 lbs per ton, is 120 lb. On an ascending grade of one foot in the hundred, it is increased one per cent. on 6,000 lbs; that is, 60 lbs: making the entire traction on that grade 180 lbs. On a grade of two feet in the hundred, we must add 120 lbs; on a grade of three feet to the hundred, 180 lbs; and on a grade of four feet to the hundred, 240 lbs: making the total traction on the last grade, say of one foot rise in twenty-five, 360 lbs: that is, *three times the draught exerted on a dead level.*

But now, let us suppose two horses, on an ordinary earth road, to draw one ton or 2,000 lbs. The traction, on a level, is 120 lbs; the same as that of the load of 6,000 lbs on the level plank road. But on arriving at a hill, does the draught increase in the same proportion as on that 6,000 lbs? Let us see. On an ascending grade of one foot in a hundred, the increase, being one per cent. on the load as before, is, in this case, but one per cent. on 2,000 lbs, or 20 lbs; and on a grade of four feet to the hundred, or one foot in twenty-five, it is but 80 lbs. This added to 120 lbs., the traction on a level, gives but 200 lbs. The load, *instead of being trebled*, as on a plank road at the same grade, *is not even doubled*: it is increased only by two-thirds of the original amount. With a traction of 120 lbs to the ton, on a level, (as on an ordinary earth road) it would require an ascending grade of 12 feet in the 100, or one foot rise in eight and a third, to treble the traction.

It follows, that a grade of 1 foot in 25 is as steep in proportion for a plank road, as a grade of one foot in eight and a third is, for a common earth road; or, in other words, that the former grade increases the draught on a load in the same proportion on a plank road, as the latter does on a common earth road.

This happens, not because the actual increase of draught caused by an ascent, is greater, on any given load, at any given grade, on a plank road than on a common earth road: it is not greater; a horse can pull up any grade on the plank more than he can on the earth: but only because the increase bears a greater proportion to the level traction in the one case than in the other; or, otherwise expressed, because the per centage on the heavy load which a horse can draw on the plank road is greater than the same per centage on the lighter load which is all he can draw on the earth road.

The plank, as a surface-material for a road, overcomes a great portion of the friction, whether on a level or on a hill; but it cannot overcome the *principle* of increase on ascents, which remains unchanged whether the ascending grade be laid with the smooth and costly iron rail, or constitute part of the line of the roughest and muddiest highway.

On a railroad the influence of this principle is felt, far more sensibly, even, than on a plank road; as any one may have remarked, who has seen a horse drag, with ease, a car along a level portion of a railway, but suddenly arrested by the increased traction, on arriving at an ascent so gentle as to be hardly perceptible to the eye. As a horse, on a railroad, can draw four times as heavy a load as on a plank road, an ascent of a single foot in a hundred, on the former, adds the same proportion to the draught of the load, as an ascent of four feet in a hundred, on the latter.

In Gayffier's "Manual of Bridges and Highways,"* the extra exertion which a horse may properly be required

*Page 9.

occasionally to put forth, beyond what he can regularly and constantly draw, is put at double his usual exertion. Other writers set down the proportion at three times. This latter limit should not be exceeded; and it is desirable to keep somewhat within it.

If Gayffier's estimate be made the basis of a rule as to grades; that is, if a horse, at the steepest hill, should not be required to exert more than double his ordinary exertion on a level; then the maximum grade on a plank road should not exceed two foot rise in a hundred, or one in fifty; since, at that grade, the traction is twice as great as on a level. And if we look to perfection in laying out such roads, it is undoubtedly desirable, that grades thereon should be limited to one foot rise in fifty as a maximum. That slope constitutes, in theory, what is technically termed the "angle of repose;" that is, the grade upon which a wagon or carriage descending would require from the horses, no exertion either to draw it down or to hold it back. In practice, however, with ordinary wheels in usual order, I think that a hill with a slope of one in forty will more nearly fulfill the above conditions; or, in other words, that a descent of one in forty on a plank road, is that degree of steepness on which if an ordinary wagon or carriage be placed, it will remain stationary; but if it receive a slight impulse, it will descend slowly by its own weight.

But to attain theoretical perfection; to limit the maximum grade of a plank road to 1 in 50, or even to 1 in 40, commonly demands a cost, which, on an ordinary line of road, would not be justified.

The second estimate alluded to, namely that a horse should not be required, on extra occasions, to put forth more than three times his usual exertion, furnishes a rule more

easily followed out in practice. On a grade of 1 in 25, the increased traction being four per cent., while the traction on a dead level is two per cent., the load is just trebled. And to this limit, in my opinion, the grades on plank roads should, in all cases where it is practicable at any reasonable expense, be restricted. It would, indeed, be better that that limit should not be reached. Gillespie recommends one foot rise in thirty as a just medium between too great expense and too steep grades. This is the limit adopted on the Mount Vernon and New Harmony road. Nothing short of a lack of funds, or a heavy percentage of additional cost in construction, should prevent its adoption on all plank roads. At that limit, the traction on the steepest hill will somewhat exceed twice and a half what it is, on a level.

Nor let it be imagined, that it is of little moment, whether, on but one hill on a long line of road, the maximum grade be departed from. A single heavy grade, especially if it be of considerable length, tends to diminish, for all practical purposes, the power of draught on the entire line. It is useless to draw to the bottom of a hill a load which the horses employed cannot drag up it; for the expedient of keeping, at the foot of such an ascent, spare horses to hire, though sometimes adopted in England, is troublesome, and will not be resorted to in this country. A single over-steep grade, then, becomes the one weak link in a strong chain; diminishing, in practice, the available strength of the whole line.

Upon the same principle, it is desirable, that the grade on the longest hill occurring on any road, should not reach the maximum limit. That becomes, as it were, the pinching point of the road; the point where a greater amount of sustained exertion is required from the horses, than at any

other. And if, therefore, at that point, we diminish the exertion, the general capability of the whole road is thereby increased. Thus, on the Mount Vernon road, the longest hill is that descending into the valley in which Harmony is situated. Its length, as has already been stated, is half a mile, and its grade averages but 1 in 37. Had it been run up to the maximum limit of 1 in 30, the exertion there demanded of the horses would have been greater than on any other hill throughout the road. As it is, by making gentler the grade, the length of the ascent is, as it were counteracted, and the total amount of fatigue to the horses is probably not greater than on a hill only quarter of a mile long, graded throughout to a slope of 1 in 30. The shorter the hill, the less the evil of a heavy grade.

It is proper, however, here to remark, that, on many of the New York plank roads which seem to have satisfied the public, the above recommendations have been widely departed from. On very few of them has the maximum grade been set as low as 1 in 30; many of them have occasional grades running as high as one foot rise in a rod, or about 6 feet in 100, and there are examples of short pitches with a grade of 1 in 10; even upon which, it is said, horses do not slip.

Sometimes these heavy grades are almost necessitated by the character of the country through which the road runs. The plank road, for example, from Cazenovia to Chittenango, winds down a precipitous mountain glen and passes a water-fall 140 feet high; the entire descent, in about ten miles, being 800 feet. Its occasional grades, therefore, of a foot rise in a rod, are only what might be expected on such a line. On other roads, however, where the line was comparatively favorable and where a grade of 1 in 30 could have been attained at small extra cost, I found the limit of 1 in 20 adopted as "good enough."

Before we imitate such an example, let us compare the practical results from the grade of 1 in 30, the maximum on our Mount Vernon road, and that of 1 in $16\frac{1}{2}$, the maximum on the Cazenovia and many other New York roads. Put the load at one ton. Then,

On the Mount Vernon Road,	lbs.
Traction of one ton, on a level, - - -	40
Increase on grade of 1 in 30, $3\frac{1}{3}$ per cent. on	
200 lbs. - - - - - -	$66\frac{2}{3}$
Total traction of one ton on steepest hill, -	$106\frac{2}{3}$
But on the Cazenovia Road,	lbs.
Traction of one ton, on a level, as before, -	40
Increase on grade of 1 in $16\frac{1}{2}$, say 6 per cent.	
on 2000 lbs. - - - - -	120
Total traction of one ton on steepest hill,	160

The draught in the one case is fifty per cent. more than in the other. Up the steepest grade of our road, therefore, a team could draw *three* tons with the same ease as it could draw *two* tons up the steepest grade of the Cazenovia road.

Road grades are sometimes measured by degrees, indicating the angle of ascension, instead of being measured by the number of feet perpendicular rise for each hundred feet horizontal. A slope or grade of *one* degree corresponds to 1 foot rise in 57, or about a foot and three quarters rise in 100: a grade of *two* degrees corresponds to 1 in 29, or about three and a half feet in 100: a grade of *three* degrees corresponds to 1 in 19, or about five feet and a quarter in 100: and a grade of *four* degrees corresponds to 1 in 14, or about 7 feet rise in 100. This latter grade

is, I believe, the maximum on the Cumberland road where it crosses the Alleghenies. On the Syracuse and Central Square plank road, already noticed as the first ever constructed in the United States, one hill was left with a grade exceeding the above; namely of 1 in 12, or about 8 feet rise in a hundred; but the length of this steep ascent was thirty or forty rods only.

Such a grade on a plank road compels a horse to put forth five times the exertion demanded from him on a level. It need not be added that a horse can never, profitably or safely, be called on for such an exertion; unless, indeed, we suppose his load on a level, to be but half of that which, on a properly graded road, he ought to draw. The practical effect is to reduce, to one half what they should be, the capabilities of the road.

If plank roads are to be useful and profitable servants to us, we must not suffer them to be shorn of half their strength.

CHAPTER VI.

CONSTRUCTION. EXCAVATION AND EMBANKMENT.

Where the natural surface along the line of any projected road becomes steeper than the limit of the maximum grade that may have been adopted by the road Company, the grading ought to be let out by contract to the lowest responsible bidder.

Previously to letting out any contracts, general specifications ought to be adopted; and these should be append-

ed to every separate contract and made a part of the same. These general specifications ought to provide:

1. That contractors shall not, during the progress of the work, obstruct any road over which the right of way may have been granted, nor any road crossing the same.

2. That the work shall be commenced at any point designated by the Acting Commissioner; and shall be executed in accordance with stakes which he will cause to be set to mark the location of the road, its slopes, &c. And reasonable care should be required of the contractor to preserve these, while the work is in progress.

3. That any increase or diminution of the amount of work of the same description as named in the contract, shall be paid for, or deducted, at contract prices.

4. That whenever materials delivered for the use of the road are rejected by the Acting Commissioner or his agent, they must be removed at the expense of the contractor.

5. That all contracts shall be fulfilled under the personal superintendence of the contractor; and not sub-let.

6. That all work remains at the risk of the contractor until fully completed and received by the Acting Commissioner.

7. That estimates of the work done shall be made monthly, if required; that 85 per cent. of the estimate shall be paid, and 15 per cent. retained till completion of the work, as security for its faithful performance.

8. That the embankments be formed of pure earth, sand, clay, gravel or rock, and that no perishable or vegetable matter be admitted into them, except stumps, which may remain, provided they do not reach within one foot of the surface of the embankment.

9. That the embankment be twenty feet wide at top, unless otherwise specially directed; that excavations be

twenty-five feet wide at bottom, with side ditches, each two and a half feet wide.

10. That the side slopes of embankments have a slope of one and a half foot horizontal to one foot vertical ; and that excavations have a slope of one foot vertical to one foot horizontal.

11. That the side-slopes of excavations be neatly and evenly dressed, and that all stumps be removed therefrom or burnt.

12. That all stumps on the line of the road be burnt or otherwise disposed of, as the Acting Commissioner shall direct: the grubbing or burning of all stumps in excavations exceeding one foot in depth to be considered as included in the price of excavation.

13. That where adjacent to excavations, embankments shall, in all cases, be formed of materials taken from the former ; and that the whole will be reckoned as excavation only, no matter what the distance, unless there be an excess of embankment ; in which case that excess will be reckoned at the same price as the bid for excavation.

14. That all materials for embankment taken from adjacent side ditches will be considered as excavation only.

15. That contractors must make the necessary allowance for shrinkage and settlement in the embankments ; as they will, in no case, be considered complete, until at the proper height after consolidation.

In addition to the above specifications, if any wooden bridges occur on the line, it should be specified, that the contractor shall provide a competent and experienced mechanic to direct their framing and building, in conformity with drawings or directions, to be furnished by the Acting Commissioner ; that the timber whether hewed or sawed, should be of full size, and entirely free from sap,

bad knots, shakes, wanes or other imperfections impairing its strength and durability ; and, finally, that, in all cases where the timber is delivered before the contractor is prepared to proceed with the framing, it must be raised from the ground and piled in a manner most likely to prevent springing, warping or other bad effects from the weather.

In case of erections of stone, the best works on stonemasonry should be consulted, to obtain general specifications.

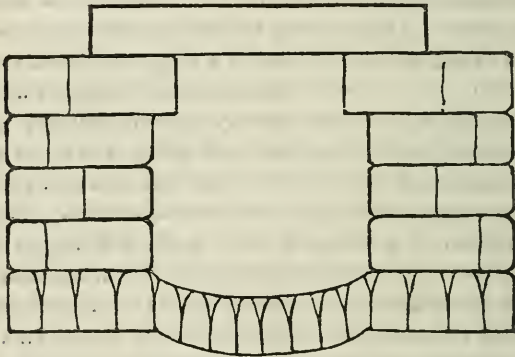
Where there is any considerable excavation and embankment, these should be made, if possible, to balance each other. This is easily effected on a smooth hill-side, or in cutting across the spurs of a ridge, with small valleys between, or in a road where alternate hills and hollows occur. It is to be remarked, however, that any given amount of yards excavated will make, when laid up in embankment, from one fifth to one tenth less ; the percentage varying according to the nature of the soil. Thus an excavation of a thousand cubic yards will supply from eight hundred to nine hundred yards only, in embankment.

An embankment left to settle, should not be rounded at top, but rather hollow, so as to suffer the rain to sink into it. In raising a heavy embankment, it is better that the earth should be carted in layers of about two feet thickness ; but if it cross a deep and narrow ravine, one cannot reasonably expect a contractor to bind himself to this rule. An embankment of any considerable height becomes more solid if carts are used, than if the earth is moved in wheelbarrows.

When a culvert becomes necessary under an embankment, at a depth of more than six or eight feet and there is not a sufficient supply of running water to keep the same constantly submerged, I recommend that stone be

adopted as a material, if it can be obtained at any reasonable cost. It is difficult and expensive so to construct a wooden culvert, that, when it decays, it can be removed and renewed without digging down to it: and this last expedient, if the embankment be deep, is costly and troublesome.

The form of stone culvert adopted on the Mount Vernon road will be understood from the following figure and specification:



SPECIFICATION.

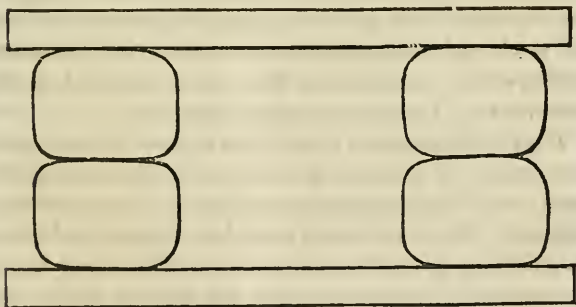
“To be of good sound rubble work, set in good lime and sand mortar. The covering slabs to be neatly jointed and closely set together. The floor of the drain to be concave and its center two inches below the bottom line of the side walls; to be paved with stones set on edge lengthwise of the drain, and to be not less than five inches deep; set firmly side by side and the interstices filled up with stone chips, packed in with a small hammer; and then finished with a light coat of hydraulic lime.

“The opening of the drain to be 18 inches by 20, in its greatest depth. The side walls to be not less than 12 inches thick and eighteen inches high. The covering stone to be not less than 4 inches thick and 28 inches long. The upper course of the side walls to project 2 inches into the opening.

“As the upper end of each culvert a flat slab to be sunk, after the manner of sheet-piling, three and a half feet square. The discharging end to be paved beyond the drain with a concave pavement similar to the bottom of the drain, but two feet and a half wide and three feet long.

“The culvert to be continued to the extreme tow of the embankment and the face, at each end, to be neatly hammer-dressed.”

The essential matter, in the construction of such a culvert, is to prevent the undermining, by the water, of the drain-floor and the side walls. The precautions, therefore, of sinking a protecting slab at the upper end, and



continuing a pavement at the discharging end, are important. I am not sure, that, under ordinary circumstances,

the coating of hydraulic lime is necessary. An inch or an inch and a half of fine gravel, hard rammed with a pavior's betel, would probably serve as good a purpose.

A cheap and simple wooden culvert may be constructed by laying down plank two and a half or three inches thick and four feet long, as a floor; then let each side wall be composed of two logs, each squared on two sides, not less than 9 inches high and 13 inches wide. Cover with the same plank as that used for the flooring. The plank had better be of the same thickness as that used for the road; so that refuse plank, of which a half length is sound, can be employed. (See figure on page 53.)

A stone culvert ought never to have an opening of less than 18 inches square, no matter how small the amount of drainage it is intended to effect; since it may become necessary, in case of its becoming choked up, to send in some one, to clear it out.

The stone culverts on the Harmony hill cost, by contract, a dollar and a quarter a running foot. The stone (a sandstone) was furnished in the quarry, without charge to the contractors, and had to be hauled about two miles, over bad roads and during inclement weather. All other materials, except the hydraulic lime, were furnished by the contractors. The price was a moderate one.

Heavy embankments ought to be allowed to settle, several months if possible, before the superstructure is laid upon them. Light embankments, say of 2 or 3 feet only, especially if they are on the line of an old road, had better be thrown up just before the plank is ready; as any travel passing over them tends to injure and displace them.

The road-bed on an embankment of considerable height had better be 22 feet wide instead of 20; as the edges will wash, more or less. If the funds of the road, however,

run short, a high and short embankment may be made half width only, say 12 feet, with the plank road in the center; in which case, of course, wagons cannot pass each other upon it, but must wait, as at the end of a narrow bridge, till the passage is clear. But this expedient ought not to be resorted to, where the amount of travel is considerable. If it be adopted on a country road, and the travel increases, it is an easy matter, at any time, to add to the width of the embankment, and move the plank to one side.

CHAPTER VII.

CONSTRUCTION. SUPERSTRUCTURE.

The execution of the superstructure (that is to say, the ditching and light grading, and shaping of the road on such portions of the line as do not exceed in steepness the limit of maximum grade, and also the laying down of the plank) should not be let out by contract, but ought to be executed, under the personal supervision of the Acting Commissioner, by companies of from 10 to 15 hands, each company under the charge of a foreman. If let out by contract, the work may be slighted so as greatly to impair the durability of the road, without the possibility of detecting the deficiency when the whole is completed and ready to be received.

The essential, in laying down a plank road, is, that as well when first made as after it settles, *the plank should rest solidly and immoveably on the ground.* Any mode

by which this can be thoroughly effected will make a good and durable road. One of the chief conditions upon which this permanent solidity depends is, that the road-bed be completely drained. There is, therefore, no one point, in the construction of a plank road, more important, than effectual drainage. To attain this essential object ditches of sufficient size should be opened, and at all times kept open, throughout its entire length; and the side levels, in the construction of the road, must be carefully preserved.

It is a common thing, especially on high rolling land, to omit ditches, along plank roads; but such carelessness is any thing but true economy. In such situations, the side ditches of the road need not be so deep or wide as on low, flat land; but they can no where be safely dispensed with. The average width of side ditches should not, at top, be less than four feet, nor their average depth less than 16 inches. A ditch six or seven feet wide, however, may often be necessary to drain flat, marshy land; while, in a considerable excavation, a ditch on each side two and a half feet across, may, for the sake of economy, be made to suffice. Where the road cuts into a long hillside and a single ditch on the upper side only is necessary, there should be frequent small culverts under the road, to prevent the accumulation of water in the ditch; and a guard-ditch along the upper edge of the side slope, if the hill above be of any considerable height, is a necessary precaution.

Care must always be taken, when the road passes over a level, that the bottom of the side ditches shall have a slope, lengthwise, sufficient to carry off the water that flows into them. This slope should never be less than 1 foot fall in 120. The same is true of the road-bed itself;

which, in its longitudinal grade, should never approach nearer to a level than 1 foot rise or fall in going 120. Where the ground for a great distance is perfectly level, the road should be artificially formed into gentle undulations, its slopes alternately rising and falling at the above rate.

The road-bed, between the ditches, is usually twenty feet wide. One side of the road is occupied by the plank, the other is graded into an ordinary earthenroad upon which to turn out. Sometimes the plank are laid close up to the ditch, but this is a faulty construction; the side of the ditch is apt to crumble down, so as to expose the lower surface of the plank. There should be a width of eighteen inches intervening between the outer end of the plank and the edge of the ditch; and, to facilitate drainage, this intervening space should have a slant of an inch to a foot.

The width of that portion of the road which is laid with plank is usually eight feet; and this is found sufficient for all practical purposes, even on roads much travelled. Over a single track, in the vicinity of Syracuse, upwards of 160,000 teams passed in two years; making an average of about 220 teams per day. In the immediate vicinity of a populous town, however, a double track (that is, two separate tracks running side by side and each eight feet wide) is desirable.

On wet, yielding soil, where a wagon turning out with two or three tons load would be likely to mire down, portions of a second track, in the form of turn-outs, (say forty feet long and occurring at intervals of 150 or 200 yards apart) will be found necessary. On the New York roads this expedient is seldom resorted to; but their soil is usually much firmer and more gravelly than that of our Western States. To what extent wooden turn-outs will be

required in the latter, time alone can determine. It is to be remarked, however, that if, for lack of such a provision, it should become customary, in wet weather, to load teams one-third or one-half less than would otherwise be usual, the loss, by dispensing with them, would be very great.

On the other hand it should be remembered, that the earth-road used to turn out on, commonly remains in much better order than an ordinary road. By the rule of plank roads, light teams always give way to heavy ones, and this saves it considerably. Again, as a team merely turns out upon it to return again immediately to the plank, there are no continuous wheel-ruts, to receive, and become a channel for the rain; and, besides, it is unlikely that any two wagons, in turning out, will strike precisely the same track.

But, to ensure its continuance in good order, it must have a side slant sufficient for effectual drainage. Some have recommended eight or nine inches, but I think about half an inch to a foot—say 5 or 6 inches in its entire width of ten feet and a half—is sufficient.

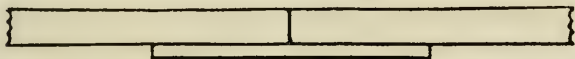
The plank should have a side slant, in their entire width, of not less than an inch and a half, on hard, dry ground, and not more than two inches on wet, flat ground. On some roads a slant of three inches has been adopted; but I have been told, that in slippery weather, on that slant, the wheels are apt to slide: and, in addition, a slant as great as that, amounting to nearly two inches in the width of a wagon-track, continually kept up, by throwing the load unequally on the wheels, is said to produce a sensible injury to the axletrees.

On a rapid turn the road-bed should be twenty-two feet wide; and, if the plank are on the outside of the turn, the

minimum slant of an inch and a half should always be adopted: while, if they are on the inside, the full slant of two inches should be given. For such a turn the plank have to be sawed narrower at one end than at the other; and are better, if 12 feet long.

On any level portion of a road, where the soil inclines to be wet, the general level of the road-bed should be not less than two feet above the surrounding country.

Two stringers, sleepers or mud sills are usually laid down, parallel to each other, along the line of the road, upon which to rest the plank. Sometimes three or four stringers have been employed; and on a road very much travelled this may be a wise precaution; also wherever any road passes over wet, yielding soil. If four stringers are used, they should be laid two and two together, and so to break joint. When two only are employed they should be laid so that the end of a stringer on one side is opposite to the centre of a stringer on the other; and, in that case, at each point where two stringers abut against each



other, there should be underlaid a piece of inch plank, two feet long, and as wide or a little wider than the stringer. Upon the centre of this plank the joint should be broken. Other plans are sometimes adopted to prevent the sinking of the stringers at their points of junction; as lapping them a foot or more past each other, bevilling their ends, &c.; but I think the plan I have recommended and which is now adopted on the best roads, the cheapest by which the object desired can be effectually secured.

The distance of the stringers apart should be the same

as the usual wagon track of the country. Ours is five feet from centre to centre of the wagon-tire; and the stringers on our roads should therefore be laid five feet apart, from centre to centre.

The stringers are sunk in the road-bed and the earth filled up between them and outside of them, so that the plank, when the road settles, shall rest equally upon the earth and upon the stringers.

To effect this thoroughly, so that, after the road has been made say six months, it shall still remain solid; or, in other words, that the earth, between and without the stringers, shall not have settled away from them and left the plank resting on the stringers alone, is, in practice, not very easily done: and yet upon this, as much as upon any other one circumstance, depend the excellence and durability of a plank road. If the earth sink away, leaving a hollow on either side of the stringers, the rain will penetrate, making a substratum of mud; the plank, yielding under heavy loads, will *churn*, as the phrase is, forcing the mud up between the joints; the road becomes unstable and permanently hollow, and the plank wears out very rapidly.

I learned from Mr Alvord, of Salina, that, on a flat and somewhat wet portion of the Syracuse road, where the drainage had been insufficient and the road imperfectly constructed, the plank, resting for several rods on the stringers alone, had worn *three times as much* as on the adjacent, higher, and better drained and more solid sections. It should be remembered, then, that errors of construction, which cannot even be detected by an inspection of the finished road, may be of so fatal a character as wholly to cut off all dividends, and destroy the value of the stock in a road, which, under more prudent management, would have proved a profitable investment.

To avoid this defect and ensure solidity of substructure, we have adopted, on the Mount Vernon road, an expedient which I do not know to have been elsewhere considered necessary on plank roads. It is to employ a wooden roller, composed of the butt of a large burr oak; its dimensions upwards of three feet and a half in diameter and eight feet long; weighing about two tons and a half; with iron gudgeons and having a frame on either side to hitch to; so arranged that when it is desired to reverse the direction in which it is drawn, this can be done, without turning the roller, in a few seconds, by merely unhitching the oxen or horses and attaching them to the other side; somewhat after the manner of hitching and unhitching teams to railroad cars.

After the earth is levelled off to the proper grade, preparatory to laying the stringers, this roller is passed over it once, back and forth. The stringers are then laid, in properly prepared furrows, so that their upper surface is somewhat below the level of the earth on either side, and the roller is passed over them, back and forth, a second time; so as to settle every thing down, in a permanently solid mass, ready to receive the plank.

The other tools required in laying down the superstructure, are, besides shovels, a stout road-plough of large size; a strong iron rake, an iron crow-bar weighing 15 or 16 lbs., 5 feet long, sharpened, in wedge form, at one end, so that it can be sunk in the ground and used as a lever to bring each plank, as it is laid down, close up to the preceding one, and with a broad, flat head at the other, so that it can be reversed and employed, as a pavior's betel, to ram the plank down home. For this purpose, however, some recommend, in preference, a maul of the hardest and heaviest wood that can be got, 2 feet 8 inches high; 6 inches diameter at bottom, where it should be a little

rounding, and four inches and a half at top, with one upright, and 2 cross, handles. The upright handle is used when the maul is employed to drive the plank close up to the last laid, and the horizontal handles in pounding the plank down. On old, hard roads I have seen a heavy iron hammer employed, in preference to either of the above; but upon the whole, the crow-bar seems to me the most convenient, and has been adopted on our road.

Besides these tools a scraper is indispensable. The pattern of scraper used on the New York roads, and after long experience, highly approved in that State, differs from that commonly in use among us, and also from any which I have seen figured in works on road-making (as in Gillespie, at page 155.) It is, however, cheap and simple. The bottom board is usually of ash, from an inch to an inch and a half thick; 4 feet 4 inches by 1 foot, sloped at bottom, and shod with steel. At each end it has a stout iron strap, running over it and down behind and before. Above this is the top board, half to three quarters of an inch thick; 4 feet by 9 inches, rounded at the upper corners. It has two back handles, passing behind both boards, strongly fastened to the lower board by straps of iron, bolts and nuts; and strongly nailed to the top-board. It has also two side handles, projecting six inches; they are part of the bottom board, the portion below being cut out. The lower edge, of steel, may be secured by bolts and nuts. Part of an old saw-mill saw will answer.

This scraper requires two stout horses, attached to it by a chain passing to two stout staples; and a man at each side. Each man lays hold, with one hand, of one of the back handles, and with the other of one of the side handles; and thus it can be managed with great facility.

In using this scraper to raise and convey earth from the

ditch to the road, the horses are not turned but backed; the men lifting up the scraper and carrying it back, as soon as its load is discharged. It operates, after a little practice, very rapidly.

In organizing a party to lay down the superstructure, a stout ox-cart, three or four good yoke of oxen and a pair of horses are requisite.

The exact number of hands required depends upon the nature of the soil and the character of the old road, if the plank road is to follow any old line; but may, under favorable circumstances, be set down as follows:

To manage the plough,	-	-	2 hands.
" " " scraper,	-	-	2 "
With shovels, to level off after scraper,	2	"	
Laying stringers,	-	-	2 "
Handling plank,	-	-	2 "
To manage the roller, &c.,	-	-	1 "
Foreman, who lays the plank,	-	-	1 "

Total, - - - - 12 hands.

If the ploughing be very heavy, another hand may be required at the plough; and so also of the scraper. If any old stumps have to be removed, or other grubbing done, that will be extra; and if there be much of it, it will be found profitable to construct a stump-extractor. On the other hand, if the road be already well ditched and tolerably graded, a smaller number of hands than twelve will suffice.

The foreman ought to be a man of intelligence, good judgment and mechanical ability. Upon his faithfulness, sound judgment and strict attention to every minute detail, the character of the road, as to construction, will in a great measure, depend. The work cannot be slighted, if

he does his duty. If he fails to do so, it may seriously effect the after profits of the road. He ought to be selected, then, with great care, and well paid. On the Mount Vernon road, he receives two dollars and a quarter a day. To him is confided the charge of the hands; he keeps an account of time, &c., with each, paying them off every Saturday night; and he also keeps an account of the general expenses of the party.

The careful preservation of the levels—both the side and longitudinal slopes of the road—is an important part of his duty.

A party of good hands, under an experienced foreman, will ditch, grade and lay down, in the best manner, on the average, from 30 to 40 rods a day, sometimes more: say, allowing for wet days, not less than half a mile a week; at a weekly expense, probably, of about a hundred dollars. This portion of the work, then, ought, under ordinary circumstances, to cost, (without grubbing) about \$200 per mile: but the labor and consequent cost will vary, very considerably, on different lines of road.

The general mode of proceeding (frequently varied, however, by circumstances) is this. Suppose the plank is to be laid on the right hand side of the road, the plough goes first, ploughing up along the line of the right hand ditch, and returning on the left. The scraper follows, throwing up from the right hand ditch, and dropping the earth regularly, as far, however, as the centre of the road only. Two men follow the scraper, and level off carefully with shovels. After the roller has passed, two other hands form the stringer-furrows, and lay the stringers. Two more bring the plank from small piles on the road side; and the foreman, standing on the plank last laid, sinks his crow-bar into the earth, just below the outer edge

of a new plank, as soon as the men lay it down, and with a jerk forces it back to its place, occasionally adjusting it edgewise by dropping the instrument at one or the other end: then reversing the crow-bar, he pounds, with its flattened head, along the line of the plank, till it settles down to the level of the preceding one.

In the meantime, the scraper, having gained considerably on the rest of the work, is brought back; the left hand ditch is thrown up, to form the earth-road intended to turn out upon. In so doing, the horses attached to the scraper are driven on to the recently laid plank, and the earth levelled to the upper edge of the plank, and usually about two or three inches above it, to allow for settling. When the roller has been past over this portion of the road, the whole is complete and ready for use.

The foreman can lay somewhat more rapidly than the ground is thus prepared for him; but he is frequently called off to determine the levels, and inspect and direct other portions of the work.

To avoid delay and useless labor in carrying the plank, it is necessary that they should be laid down at regular intervals, on both sides of the road, and that there should be exactly the same amount in each pile. The stipulation in our contracts is, "that the plank be laid down in lots 64 feet apart, each lot containing about 658 feet of the eight feet plank and four lengths of the sixteen feet plank (stringers), each lot on one side of the road to be opposite the centre between two lots on the opposite side." This amount of 658 feet (board measure) is for two and a half inch plank; if three inch plank be used, the amount in each lot would be about 777 feet. The easiest practical method, however, of getting at the quan-

ity, is to let the aggregate width of eight feet plank in each lot be 32 feet.

This stipulation should be strictly enforced; as, if the plank are dropped at irregular distances and the quantities are not exact, the hands who handle the plank may have to carry them a considerable distance; and thus the whole party may be seriously delayed. The importance of avoiding this and all other sources of delay to such a party will appear if we call to mind, that each working hour by that number of hands, including expenses, costs nearly two dollars.

As to the thickness of the plank, if the line on which a plank road is to be constructed, be, at the time it is projected, pretty well travelled, say by an average of 15 to 20 teams each way each day throughout the year, I recommend three inches. If the travel be less, averaging 8 or 10 teams each way only, two and a half inches may suffice. No road should be laid with plank thinner than that, though two inch plank has been sometimes used. And where the travel is great, say 50 to 100 teams each way a day, I think four inch plank would be found the most profitable. If of hard wood, the width ought not to exceed ten inches. If of soft wood it might run up to a foot. It should not be less than five inches.

I think it best to make the stringers the same thickness as the plank and twice the length, that is, sixteen feet. Whether single or double, they should be 5 or 6 inches wide. The stringers may thus, on occasion, be used as plank, and vice versa.

The specification in regard to plank in our contracts, is, that it shall be "either of white oak or post oak or burr oak or chinkapin oak, or black walnut or red elm or mulberry; and to be from good and sound timber, free from sap, bad knots, shakes, waness and other imperfections im-

pairing its strength and durability; to be full on the edges and of the full thickness specified." On the principal hills, however, we have specified, that it shall be of the best yellow poplar; as we did not feel assured but that horses, with heavy loads, might, in wet weather, slip on the hard wood, on these ascents.

In New York hemlock is the timber chiefly employed. It wears much more rapidly than white oak; and when considerably used, its surface becomes rough, on account of the frequent hard knots, unworn and projecting from its surface. Pine is chiefly employed in Canada, and is more durable than hemlock.

Hemlock commonly costs, in New York, \$6 a thousand (board measure.) Our plank cost us, delivered, \$9 a thousand; but if there had been a sufficiency of good steam or water mills along the line of our road it could, doubtless, have been had for \$7 to \$8. Putting it at \$8 a thousand, delivered, in regular proportions, along the line of road, the whole of the plank, including stringers, would cost, per mile, at the different thicknesses, as follows:

TWO AND-A-HALF INCH: WITH SINGLE STRINGERS, FIVE INCHES WIDE.

Surface plank, 8 x 2½ x 5280—	105,600 at \$8—	\$844 80
Stringers, 10-12 x 2½ x 5280—	11,000 at \$8—	88 00
Inch plank, to underlay stringers,	660 at \$8—	5 28

Total cost of plank, per mile, 117,260 feet \$938 08

THREE INCH: WITH SINGLE STRINGERS, SIX INCHES WIDE.

Surface plank, 8 x 3 x 5280—	126,720 at \$8—	\$1013 75
Stringers, 1 x 3 x 5280—	15,840 at \$8—	126 72
Inch plank, to underlay stringers,	660 at \$8—	5 28

Total cost of plank, per mile, 143,220 feet \$1145 76

FOUR INCH: WITH DOUBLE STRINGERS, SIX INCHES WIDE.

Surface plank, 8 x 4 x 5280—168,960 at \$8—\$1351 68

Stringers, 2 x 4 x 5280— 42,240 at \$8— 337 92

Total cost of plank per mile, 211,200 feet \$1689 60

On the Mount Vernon road, of fifteen miles, as the plank is delivered at the rate of about two miles a month, a single party suffices to lay down the superstructure. To afford greater facility in moving from place to place, wherever the plank are ready for them, they are provided with a couple of tents, and are supplied with board. This arrangement, rendering the party independent of board and lodging in the neighborhood, facilitates the preservation of good order among them, and enables them to be readily brought together at the regular hours of work.

From 15 to 17 miles of road is as much as a single party, say of 12 to 14 hands, can be expected to lay down, in the course of a season, beginning as early in the spring as the work can be profitably undertaken and ending at the setting in of winter.

CHAPTER VIII.

TOLLS AND TOLL GATES.

Toll gates are commonly placed an average of six miles apart; and one is usually erected from one to two miles from any considerable town. Their exact location is often governed by the point at which a cross road, of any importance, strikes the main line.

The usual pay of a toll-gate keeper is ten dollars a month, besides a free house and garden spot; and, under ordinary circumstances, the man follows some trade, while his wife or child attends the gate. But where the amount of travel is very great, extending through a portion of the night and demanding the gate-keeper's constant attention, as in the case of the toll-gate already mentioned two miles from Syracuse, twenty dollars a month, besides house and garden, is given.

The gate-keeper is required to keep a small account book, in which he sets down the gross receipts of each day. This he hands monthly to the Secretary, who copies and returns it to him. He is not usually required to make oath to his accounts, but gives security, usually in the sum of five hundred dollars. He settles, on some roads daily, on some weekly, on some monthly, with the Treasurer.

In Canada, instead of paying the gate-keeper a fixed salary, the usual custom is, to farm out each gate to the highest bidder. This plan is not, I think, suited to the present condition of our Western country, in which the amount of travel is exceedingly uncertain, and often increases, in a brief period, in an unexpected proportion.

The toll-gate-keeper is required to open his gate to the traveller, at all hours of the day and night, Sunday included.

The limit of toll and the legal exemptions therefrom are fixed in each State, by the General Plank Road Law; sometimes by special Act of Incorporation. The only exemptions by the law of our State, are in favor of "persons going to and from funerals, and soldiers of the United States or of this State, while in actual service." A road company may, of course, add other exemptions; but this is not customary except in favor of its Board of Directors,

each of whom, during his term of service, is usually allowed to pass, either on horseback, or with his family or others in his own carriage, toll-free. This frank, however, is personal only, and does not extend to wagons or goods belonging to a Director.

The limit of toll differs in different States; and may reasonably be put lower in an old settled country, than in a new and thinly populated one. By the General Plank Road Laws of New York, Kentucky, Indiana and Illinois, it is fixed as follows:

UNDER THE LAW OF NEW YORK.

For every horse and rider, not more than $\frac{1}{2}$ ct. per mile.

"	"	one-horse vehicle	do	$\frac{3}{4}$	"
"	"	two-horse vehicle	do	1 $\frac{1}{2}$	"
"	"	three-horse vehicle	do	2	"
"	"	four-horse vehicle	do	2 $\frac{1}{2}$	"
"	"	score of cattle, hogs or sheep	1		"

UNDER THE LAW OF KENTUCKY.

For every horse and rider, not more than 1 ct. per mile.

"	"	one-horse vehicle	do	2	"
"	"	two-horse vehicle	do	3	"
"	"	three-horse vehicle	do	4	"
"	"	four-horse vehicle	do	5	"
"	"	score of cattle	do	10	"
"	"	" " sheep or hogs	do	1	"

UNDER THE LAW OF INDIANA.

For every horse and rider, not more than 1 ct. per mile.

"	"	one-horse vehicle	do	1 $\frac{1}{2}$	"
"	"	two-horse vehicle	do	2	"
"	"	three-horse vehicle	do	2 $\frac{1}{2}$	"
"	"	four-horse vehicle	do	3	"
"	"	score of cattle, mules or asses	5		"
"	"	" " sheep or hogs	do	2	"

UNDER THE LAW OF ILLINOIS.

For every horse and rider, not more than 1 ct. per mile.

"	"	one-horse vehicle	do	2	"
"	"	two-horse vehicle	do	3	"
"	"	three-horse vehicle	do	3½	"
"	"	four-horse vehicle	do	4	"
"	"	score of cattle, sheep or hogs		2	"

The question has often arisen, whether, on a tolled road, the distance between the gates, or the number of miles actually travelled, or intended to be travelled, shall be the measure of the toll collected. The legal decisions have been in favor of the former construction. In the case of *Stewart v. Rich.* 1 Caines, 182, the opinion given by Judge Kent was as follows: "The idea that the Company must vary the toll at every ten-mile gate on the suggestion that a person has used the road for a less distance than ten miles is inadmissible, because impracticable. The toll-gatherer has no means of knowing whether the traveller has rode ten miles, or a less distance, previous to his arrival at the gate. If this suggestion was allowed to be a ground of reduction of toll, it would open a door to the greatest imposition and fraud upon the Company."

So, also, in the case of the *People v. Kingston and Middletown Turnpike Company*, 23 Wendell, 193, where the words of the Act incorporating the Company, were, "the following rates of toll for every ten miles, and in the same proportion for a shorter distance," the Court (Nelson C. J.) decided: "This clause refers to the distance *between the gates*; if that be five miles, the corporation may demand half toll; if it be two and a half miles, they may demand a quarter toll, and so in proportion." In the same case Judge Cowan gave an opinion similar to Judge Kent's: "The replications leave it to be taken as admitted, that

this proportion was fixed according to the distance of the gates, and merely find fault that it was not limited to the distance of actual travel, as five, three or one mile, or half a mile. Such a construction would leave every traveller to estimate his own toll, and make it utterly impracticable for the toll-gatherer to perform his duty. It would lay him open to continual imposition."—p. 220.

It is worthy of remark, however, in this connection, that the Plank Road Law of this State contains a provision which I have not noticed elsewhere. It is, that "if any person or persons using any part of such road shall, with intent to defraud said Company, pass through any private gate or bars, or along any other ground near said road, to avoid any toll-gate, or *shall make any untrue statement as to the distance he or they may have travelled or intend to travel on the road*, or shall practice any fraudulent means," &c., they shall "for every offence forfeit and pay to such Company the sum of three dollars," &c. No legal decision has yet, I believe, been had, on this point, under our law; and, if any case were contested, the plea would doubtless be set up, that, by the enactment of the above penalty, it is fairly to be inferred, that the law contemplated the trusting to the averment of the traveller as to the number of miles for which he was liable for toll, whether already travelled or still to be travelled.

On the other hand, if such a principle is to be admitted at all, and if the number of miles of road actually used by the person presenting himself, is to be, in each instance, the measure of the toll, it would be difficult to say, why the gate-keeper has not the right to enquire, whether, in the interval between the last payment of toll and the present, the individual in question has not, on different days, used portions of the road between gates without paying for

the same; and if he has, why the gate-keeper should not require, under a penalty of three dollars, a statement of the various distances thus travelled, though at intervals of days or weeks, and adding them together, demand payment of toll upon the whole. Again, suppose that a person, in passing a gate declares his intention of going two miles further only, thinking there to meet a neighbor with whom he has business, and paying toll for two miles only; but not finding his neighbor there, rides on two miles further in search of him; is to be fined three dollars for false representation? or, if not, is he, the next time he passes the gate, to correct his statement, and pay for the two additional miles?

It is impossible, under any system of tolls, that, in every individual instance, the traveller should pay for the precise number of miles he has used. The advantage will sometimes be with him, sometimes with the Company. And the principle above referred to seems to me so impracticable of application, under the varying chances of travel, that I believe the decision under our law will be, as elsewhere it has been, against it.

In the case of persons living near a gate-house, a system of commutation, at fair rates, will remedy much of the apparent injustice of charging full toll for a short distance.

The frontispiece to this volume gives the plan of an economical and convenient gate-house, copied, with some modifications, from the model adopted on the Cazenovia road, and for a plan of which I am indebted to my friend, General Hough, of Cazenovia. Its cost, including a two acre lot of ground for garden and orchard, may be set down at \$350 to \$400—say \$75 per mile. It will be perceived, that it affords shelter to the traveller, while stopping to pay toll.

In the plan, A is the living room, 15 by 17 in the clear, besides a recess for a single bed, c. B is a small bedroom, with bed, b; and is 7½ by 10 besides the recess where the door opens. C is a pantry, 7 feet by 7½, with shelving, d, d. E is a summer kitchen and wood shed 10 by 18½. G is the toll-bar, under cover, the roof being continued to the frame H K. D is a portico, open in front to the road, with step, e, e, 18 inches wide; n is the cellar landing and m the landing from the attic.

This toll-gate house, 18 by 30, or including the covering which extends over the plank road, 18 by 42, is a story and a half high, the side walls in the attic story having 4 feet perpendicular height. It has a stove chimney for the cooking stove, a, commencing on the second floor. The attic story may be merely closed in. There is a cellar, 6 feet deep and 12 feet square; which, in many soils, can be finished cheaply and substantially enough, by digging the sides with a slant and plastering with hydraulic lime, instead of brick walls.

It will be observed, that when the toll-bar is closed at x, foot passengers, by stepping into the portico, can pass around the post, x; and that the arrangement of the house is especially adapted, so that a woman or children can attend to the domestic work, and still tend the gate.

CHAPTER IX.

CAPABILITIES OF PLANK ROADS.

Horse power is a matter of very uncertain calculation,

notwithstanding the numerous experiments that have been instituted to determine it. It must, to a certain extent, ever remain arbitrary. The half-starved woods-colt, put to work before he is three years old, and the portly dray-horse of the London streets, belong, indeed, to the same species, but the limit of power in the one is so far beyond that of the other, that an accurate average between extremes so wide, is difficult to be found.

The usual conventional estimate of the power of one horse per day, is, 150 lbs. moved at the rate of two miles and a half an hour for 8 hours; that is, 150 lbs. moved 20 miles a day. This is the equivalent of Watt's horse power; which he put at 33,000 lbs. raised one foot in one minute. Tredgold gives 125 lbs. instead of 150; Smeaton gives 107; Hackette, 128; Gaiffier, for a strong horse, 143 lbs., 22 miles a day at the rate of two miles and three quarters an hour; and for an ordinary horse 121 lbs. for 25 miles at the rate of two miles and a half an hour. Amontons calculates, that two horses attached to a plough, on moderate ground, exert each a force of 150 lbs.; and Mr. Geddes of Syracuse, informed me, that the result of various experiments made on different two-horse ploughs of approved construction, at an agricultural fair in that neighborhood, showed a traction, under ordinary circumstances, varying from 300 to 500 lbs. Nor is the direction of force to draw a plough the most favorable for a horse; the line of direction should be level with his breast. Desaguliers says a horse can draw 240 lbs. for six hours a day. And it is said, that a horse of extraordinary power has, for a momentary exertion, drawn as much as 800 lbs.

The power of draught decreases sensibly as the velocity increases. Most writers set down the power of a horse going five miles an hour at about half the power of

the same horse going 2 miles only; and estimate, that the power is reduced to one quarter, if the velocity be increased to 8 miles an hour.

Again, on steep grades, horse power rapidly diminishes. If continued exertion for 8 or 10 hours a day be demanded of a horse, the usual estimate is, that up an ascent of 1 in 7 he can carry his own weight only.

I incline to put the power of a wagon horse, of ordinary quality, such as we use here in the West, at 100 lbs., moved at a common walk, 20 miles a day. His regular, continued exertion on a level should not, I think, exceed three-fourths of that amount; and, on the steepest hill, it should not more than double it. In other words, the entire traction of a one-horse load, wagon included, should not, on a level, exceed 75 lbs.; nor, on a hill should it go beyond 200 lbs. Some horses, of course, can do more than this, with great facility. Last winter, on the Boonville (N. Y.) plank road, two horses drew over three miles a wagon loaded with 12,500 lbs. of stone. The road was not level, though its grades were moderate. The horses, however, were picked animals, and it was a trial of what they could do. They performed the task readily and without injury.

Again, from Chittenango to Cazenovia, with a total ascent of 750 feet in 9 miles, and several grades of a foot to a rod, two horses not unfrequently haul 6,000 lbs. From 4,500 to 5,000 is, however, a more ordinary load.

These are all above the average I have set, but in other cases, horses of inferior breed and in bad order will not come up to it. I put it down, then, as a fair average.

If this standard be conceded (and it is considerably below that adopted by most writers) its application will readily show us the capabilities of plank roads.

The traction, at a walk, on a well made plank road, has

been set down (in chapter 5) on a level, at 40 lbs. to the ton; and on an ascending grade of 1 in 30, the amount to be added is $66\frac{2}{3}$ lbs. to the ton.

Let us suppose, now, that on such a road, on which the maximum limit of grade is 1 in 30, a strong wagon, such as is now usually drawn by four horses and may weigh 1500 lbs., is loaded with three tons, nett; or 6,000 lbs. The entire load including the wagon being 7,500, lbs. its traction will be, on a level 150 lbs., and on a hill with an ascent of 1 in 30, $150 + 250 = 400$ lbs. If this wagon thus loaded be drawn by two horses, each will draw, on a level 75 lbs. and on the steepest hill 200 lbs.; being the exact limit proposed in a previous paragraph.

If the assumed data be correct, it follows, that on such a road, *two wagon horses, of ordinary strength, will draw, without over exertion, a wagon loaded with 6000 lbs.*

Let us compare this with the capabilities of an ordinary earth road, on which I have put the traction, on a level, at 120 lbs.; and let us suppose the limit of highest grade to be 1 in 12, a rate of ascent common on an unimproved road. Say that a common two-horse wagon, weighing 1000 lbs. be loaded with one ton. The wagon and load being 3000 lbs., the traction on a level will be 180 lbs. and on the steepest hill it will be $180 + 255 = 435$ lbs.

Thus, with a load of three tons on the plank road, the draught on a level is not as great by 30 lbs. and on the steepest hill by 35 lbs., as with a load of a single ton on the earth road. But as, on easy ascents, the earth road has somewhat the advantage of the plank road, (the traction on the light load increasing but slowly) it might perhaps be fair to say, that THE CAPABILITIES OF THE PLANK ROAD ARE THREE TIMES AS GREAT AS THOSE OF THE EARTH ROAD.

It must be borne in mind, however, that this is true only

of plank roads on which the grades are brought down to 1 in 30. It has already (in chapter 5) been shown, that when the maximum grade runs up to one foot rise in a rod, the capability of the road is reduced by one third; and consequently the power of a plank road with such a grade is but double that of an earth road, on which the steepest ascent is 1 foot rise in 12.

In comparing the two roads, however, it ought to be borne in mind, that the plank road can be used at all times and seasons; while the earth road is sometimes absolutely impassable for wagons; and is often in winter, for weeks at a time, so deep in mud, that 500 lbs. is a full load for a two-horse team.

This consideration is the more important, because it is in winter, if the roads permitted, that the farmer's chief hauling would be done. Plank roads would enable the farmer to dispense with credit in many cases, where he must now demand it; for, at whatever season of the year he came to town to make his purchases, he could bring with him the produce required to pay for these. As it is, roads nearly or quite impassable render it impossible for him to do so. And again, if he knew that he could haul at all seasons, he could make his calculations as to the delivery of produce with certainty and without risk of disappointment.

There is yet another item in the calculation of comparative capabilities well worth noticing. It has been found in practice, that the time consumed to make any given trip on a plank road is from one-fourth to one-third less than it is on the common road. The pace is quicker. Return teams usually travel at a trot. There is no detention by mud-holes, or corduroy bridging, or other bad spots prolific of accident and delay. But the gain of one-third, or even

one-fourth, of the time of a team and teamster, continually repeated, forms an item of very considerable importance, in the course of a year.

The mere average increase of power, then, however great and however important in itself, is not the sole measure of the advantage to be derived from the plank road. Not only is the new servant three times as strong as the old one; but he is always ready, storm or sunshine, never refuses to serve, and executes our behests in one-third or one-fourth less time than his dilatory predecessor.

CHAPTER X.

COST, DURABILITY AND REPAIRS.

An estimate of the average cost of plank roads must, of necessity, be somewhat uncertain, and must vary in different portions of the country, according to the cost of plank, and still more on different lines of road according to the amount of grading and bridging required. This latter item, if a maximum grade of 1 in 25 or 1 in 30 be established, may perhaps be fairly averaged at \$400 per mile. White oak plank may be safely set down at \$8 a thousand, board measure, and will probably be found to average less.

If, then, we assume 3 inches as the thickness of the plank, with single stringers 6 inches wide and without turn-outs, the entire cost of the finished road, per mile, may be averaged as follows:

ROAD OF WHITE OAK PLANK, THREE INCHES THICK.

Cost of plank, delivered, as in chapter 7,	-	\$1,145
“ of ditching, shaping and laying, do	-	200
“ of grading and bridging,	-	400
Cost of gate-houses and lots, as in chapter 8,	-	75
Engineering, superintendence and contingencies, say		180

Total cost of road, per mile, - - \$2,000

If $2\frac{1}{2}$ inch plank be employed, the cost will be about \$200 a mile less. If wooden turn-outs be necessary along the whole line, say each forty feet long and occurring at an average distance from each other of 528 feet, or ten to the mile, and laid with $2\frac{1}{2}$ inch plank, there must be added something less than \$100 a mile.

I put the average cost, then, of plank roads, with their gate-houses, complete and ready for use, at two thousand dollars per mile. In Western New York they have not averaged so much. The Syracuse and Central Square road cost \$1487 per mile; but lumber was obtained at \$5 20 a thousand. The Rome and Oswego road, 62 miles, cost \$1,300; lumber at \$4 to \$5 a thousand. The Utica northern road cost nearly \$2,000 a mile, five miles, however, being through the forest, at a cost for clearing, of \$500 a mile. Near Detroit, with lumber at \$6 a thousand, a plank road cost \$1,500 a mile.

The New York roads, however, are built of hemlock, a soft wood, though not liable to rot. My estimate is for white oak, which I believe, will bear 50 per cent. more travel than hemlock, with the same wear. If so, on all roads where the plank is worn out instead of rotting out, white oak at \$8 is as cheap as hemlock at \$5 33.

As to the durability of the former that must be, to some extent, a matter of conjecture, and will doubtless vary, on

roads on which the plank rots before it wears out, according to the nature of the soil on which the plank rests.

It has been proved, on the Syracuse road; that 160,000 teams, passing over its first 8 miles in two years, wore down the hemlock plank (where it rested solidly on the ground) *one inch*. I believe it would require 240,000 teams to wear white oak plank down as much. If three inch plank be used, it may be worn down full two inches before it need to be replaced. Consequently 480,000 teams, or say in round numbers *half a million teams* may pass over it before it is worn out.

This may seem too high a calculation; but Gillespie (*Roads and Rail Roads*, p. 247) informs us, that, on a Canada *pine* road, over which passed upwards of 50,000 teams a year, the road had worn, in two years, only *one quarter of an inch*. But if 100,000 teams wore the plank down but a quarter of an inch, 500,000 would wear it an inch and a quarter only. This more than justifies* my estimate, that white oak would receive 500,000 teams, before it wore down two inches.

It is found also, by experience, that the first year's wear on a plank road is greater than that of any year following. The first travel on the road tears off the outer splinters and fibres which the saw has cut across; the road *brooms* up, as it is called; and the coating formed by earth and sand settling into its surface protects it from wear.

I assume, then, that good three inch white oak plank, solidly laid down, will bear the passage of half a million of teams before it is worn so thin that it requires removal.

As to the natural decay, hemlock is said to last on an

* Gillespie (p. 248) states, that *oak* plank cross walks in Detroit, the plank laid flat on the ground, lasted two or three times as long as those of *pine*.

average seven years. The pine roads in Canada last from seven to twelve. I think white oak may be estimated to last half as long again, without rotting, as either hemlock or pine. Gillespie's statement, in the footnote below, would justify a much more favorable estimate. But, as a safe calculation, I think we may assume, that a white-oak road will last 12 years without rotting. Gillespie gives it as his opinion, that "oak plank, well laid, will last at least 12 or 15 years."

If the limit of natural decay for white oak be put at 12 years and the wear be set down at 250,000 teams for each inch of plank, and it is considered necessary to renew the road when the plank has worn in the center to one inch in thickness, then it follows, that, unless there be expected an annual average, throughout the 12 years, of more than 15,000 teams each way, (that is, over 40 teams each way each day) a road laid with $2\frac{1}{2}$ inch plank will last as long as one laid with 3 inches.

For to wear $2\frac{1}{2}$ inch plank down to 1 inch, it will require 375,000 teams. Divide by 12, and we have upwards of 30,000. Thus 30,000 teams, or 15,000 each way, a year, for 12 years, will not wear out $2\frac{1}{2}$ inch white oak plank.

In chapter 7, I have recommended three inch plank where the average travel, on the old road, is found to be 15 or 20 teams each way each day, at the time of the projection of the plank road: because all experience proves, that the travel may be expected rapidly to increase; probably to double itself in the first year. On the Syracuse road, as I have already had occasion to state, it more than trebled in that time.

As to the current annual repairs, Mr. Alvord, of Salina, in whose judgment I place confidence, expressed to me

his opinion, the result of much experience, that on a plank road well laid down and completely finished at first, the average annual repairs, independent of removal, ought not to exceed ten dollars per mile. The estimate of a Canadian engineer is somewhat higher; he puts it at \$20 the first year; \$10 a year for the next 5 years; and then increasing yearly, until the entire renewal. But I am of opinion that an average of \$10 per mile is sufficient, *if the road be well made*. On $3\frac{1}{2}$ miles of the Syracuse road, which had been laid down with care, the entire repairs, throughout two years, had not exceeded \$15; that is, but little more than *two* dollars a mile, each year.

A trustworthy man, owning a horse and cart, should be employed, to pass over the road occasionally, especially after a storm or a succession of rainy days, clearing away obstructions, opening choked-up ditches and doing whatever other repairs are necessary; and he should either be allowed to charge for whatever time he is actually employed and whatever labor he may find it necessary to hire, to assist him on extra occasions; or else he might take the annual repairs by contract at \$10 a mile, or such other rate as might be agreed on, paying all extra assistance himself.

We are thus furnished with the data whereby to calculate, with a reliable approach to certainty, the profits to the stockholders, which may be reasonably expected, on various lines of plank road.

CHAPTER XI.

PROFITS OF PLANK ROADS.

I know of no species of public improvement whatever, that promises, or that has heretofore produced, profits to the stockholders as great as Plank Roads. And it is my opinion, that their pecuniary success, based on a solid foundation, will continue and will increase.

There are about 180 chartered railroad companies in the United States; and their roads exceed, in aggregate length, 6,600 miles. Rated as single tracks, these have cost upwards of \$20,000 a mile. Of these railroads less than one-third (the exact proportion is very nearly 30 per cent.) pay dividends over six per cent.

Macadamized roads have usually been less profitable to their stockholders than railroads. I have not now at hand statistics sufficient to furnish a reliable estimate of their average cost and ordinary profits. The Cincinnati and Columbus turnpike cost about \$5000 a mile; and the current repairs, without reckoning renewal of bridges, are from \$300 to \$400 a year for each mile. The cost of this road, is, I believe, under the average; and the repairs do not exceed it. I think it would be safe to set down the cost of a Macadamized road as averaging three times as much as that of a plank road; and the annual repairs, as three times as great as those of the plank road including the sum necessary to be annually set aside to renew the superstructure. When we consider that a macadamized road does not afford as much as two-thirds the power of draught which is gained by a plank road, it will not appear surprising that the former has usually been an unprofita-

ble investment. Some of the principal lines in Kentucky do not pay over 2 or 3 per cent. a year. Between two such points as Georgetown and Frankfort, the shares, originally of \$100, have sunk below \$20 each.

Very different is the result in the case of plank roads. I have already stated, that, on my recent trip to Western New York, I had not been able to hear of one among the numerous plank roads recently constructed there, in full operation, that paid dividends of less than ten per cent. Some of them divide 20, some 25, 30 and even 40 per cent. of yearly profit over expenses. The most remarkable of these, perhaps, is the plank road from Rome to Utica, competing with the Erie Canal, the Buffalo and Albany Railroad and a free turnpike—and *paying twenty-five per cent.* of annual dividends!

If a report which has reached me in what seems a reliable form, regarding one of the Plank Roads terminating in Chicago be correct, the result there exceeds anything of which I have heard in New York. The tolls on that road are said to have repaid the entire cost of its construction and a per centage over, in a single year!

The data whereby to calculate, with reliable accuracy, the profits that may be anticipated on any projected line of road, are few and simple.

In the previous chapters I have supplied most of them; as the cost of road (chapter 10) which I have put, under ordinary circumstances, at \$2000 a mile; the annual repairs (same chapter) put at \$10 a year per mile; the annual pay to gate-keepers (chapter 8) put at \$120 a year, or say \$24 a year per mile.

There remains the annual expense of management. This depends, in a measure, on the length of the road. Call it 15 miles, which may be a fair average. The offi-

ces of Treasurer and Secretary may, if a suitable person can be found, conveniently be united in one; and a fair salary would be \$100 a year; the Syracuse and Central Square road pays but \$75 a year, and its annual receipts exceed \$8,000. It is not customary to pay any other officers, neither President nor Directors, except their actual travelling expenses, if called from a distance to attend meetings of the Board, or on other official business. The office of acting Commissioner is usually paid during the construction of the road, when it often employs the greater portion of the officer's time; but not after its completion. There is no current expense beyond those already enumerated except small incidentals, as stationary.

I put down the annual current expenses, then, of a road of 15 miles, as follows:

ANNUAL CURRENT EXPENSES; PLANK ROAD OF 15 MILES.

3 Toll-gates, at \$120 each,	-	-	\$360
Repairs, at \$10 a year, per mile,	-	-	150
Salary of Treasurer and Secretary,	-	-	100
Travelling expenses of Board and Incidentals, say			65
Total for 15 miles,	-	-	\$675

Divide this sum by 15, and we have the annual expense per mile, *Forty-Five Dollars*.

On roads very much travelled, where gate-keepers' salaries must be raised, the average will be greater. So, also; on very short roads, where the gates may happen to be closer together and the per centage of management a little heavier. But, in a general way, from \$40 to \$50 a year per mile ought to pay the entire current expenses of the road.

Now if we put the cost per mile at \$2000 and the annu-

al expenses (without renewal) at \$45 yearly, it follows, that if, on each mile, an annual toll of \$120 + \$45, that is to say of \$165, be received, the stock of the road will pay six per cent. annual dividends.

But \$165 a year is a little more than *forty-five cents per day*. As the toll on a two-horse team is two cents per mile, it follows, that an average of about 23 such teams will make up the necessary amount.

The general result, then, is, that AN AVERAGE OF TWELVE TWO-HORSE TEAMS PASSING ALONG A PLANK ROAD EACH WAY EACH DAY, WILL RETURN A CLEAR DIVIDEND OF SIX PER CENT. TO THE STOCKHOLDERS.*

I have already stated (chapter 1) that on the first plank road ever constructed in the United States, the number of teams increased in a single year, from 75 a day to 250; that is, it was more than trebled; and I have shown, that the cause of what seems so astounding an increase is general, not local; and is explained by the fact, that the road creates its own business. I am very sure that it would be a low and safe calculation, on any ordinary line of road, to estimate the increase the first year, at double. If, then, by stationing men along the line of any old, earth road, it be ascertained, by a sufficient number of averages, that the daily travel upon it, in its present unimproved condition, reaches the amount of *six teams* each way, each day, (say an average of a team each way every two hours throughout the day,) then I predict, that a plank road, con-

*Or the *equivalent* of 12 two-horse teams, in the various travel along a road. There will be one-horse teams, horsemen, droves of cattle, &c.; and, probably, some few four-horse teams; but of these latter very few, until wagons are constructed expressly for the plank road. In New York I do not recollect to have met, on a plank road, a single wagon drawn by four horses.

structed along that line will pay six per cent. after the first year. And I believe, that, in many cases, the calculation might be a safe one, where the average travel is but *four* teams each way daily.

As to the renewal of the superstructure (say at the end of twelve years, on a white-oak road,) it may be safely set down, that the increase of travel *after* the first year will overpay that.

Calculating at the above rates, it will be found, that an average of *twenty* teams each way each day will give a dividend of *twelve per cent.*; of *thirty* teams, a dividend of over *nineteen per cent.*; of *forty* teams, a dividend of upwards of *twenty-nine per cent.*; and so on. But on reaching this latter amount of travel, there would, probably, be a small increase of the current expenses.

It ought to be remembered, however, (as noticed in chapter 7) that the period when plank is worn out and renewal becomes necessary, may vary as much as *one to three*, according as the road is constructed on a permanently solid bed, or suffered gradually to become hollow and water charged. On this materially depends the dividends that will be realized.

Geddes* estimates, that a mile of a hemlock plank track will earn, over and above repairs and cost of collecting tolls, from \$2,500 to \$3,000 before it is worn out. If this be a correct estimate, a white oak track will pay from \$4,000 to \$5,000; say at least double the entire cost of the road. On a road, then, with travel sufficient to wear out a white-oak track in two years, the dividends should be

*In his pamphlet containing the General Plank Road Law of the State of New York, and some appended observations, p. 35.

100 per cent.;* if in four years, fifty per cent., and if in 8 years, 25 per cent. over expenses. I give this, however, as a rough estimate only; for the expenses on a road on which the plank wears down in two years (though annually greater than on a less travelled road) will not, in these two years, amount to as much as the eight years' expenses on a road, where the plank lasts that length of time.

If the estimates in this chapter touching the profits of plank roads seem to any one too favorable to be trustworthy, I remind him that the data upon which they are based, have been furnished, one by one, in the preceding pages; that these data are few and simple, and easily scrutinised; so that with but little trouble, he may verify the calculations for himself.

CHAPTER XII.

GENERAL CONCLUSIONS.

No bargain properly merits the name of a good one unless it is advantageous to both the contracting parties. No branch of trade will be permanently profitable, unless its profits are shared alike by the producer and the consumer. And thus a public improvement, to win favor and general adoption, must be productive of pecuniary benefit, direct or indirect, or both, as well to those who use as to those who construct it. Any species of improvement

*On such a line there ought to be a double track; but there is gain, rather than loss, in this, on the above estimate; since the double track will wear twice as long as a single one, and will not cost twice as much.

which eminently fulfils that condition, will become a public favorite; and, in our land of enterprise and energy, it will multiply rapidly.

I think, that, in the preceding pages, I have shown good reason for the opinion, that, in our Western country, the plank road is an improvement of the above character; that the rate of toll which will amply remunerate the stockholder, yielding him 10, 20, 30 or 40 per cent. supplies to the teamster, or to the traveller, a privilege, in the form of road improvement, intrinsically worth five or ten times what it costs.*

Over the railroad, except for great lines of communication connecting one section of country with another, the plank road, to atone for less speed and power, has many advantages.

Its prime cost is about one tenth that of a railroad, and it is consequently within the reach of moderate means. Two small towns, 10 or 20 miles apart, can connect themselves by a plank road, without going into debt. Any neighborhood of thrifty farmers can construct such a road through their settlement, yet ask no aid of foreign capital. This is a great advantage. It is always, in my judgment, a policy of doubtful propriety, that a County or a Town should issue to a large amount, and sell often at a heavy discount, their corporate bonds, for the sake of reaching an improvement beyond the present means of the commu-

*I stopped several teamsters on the New York plank roads, and in reply to my enquiries, the usual answer was, that they had rather pay *three times* the amount of the present toll than dispense with the plank road. The toll, in that State, is but 1½ cents for a two-horse team instead of two cents, as with us; but, on the other hand, their grades, often reaching 1 in 16, render their roads less valuable improvements than many of ours.

nity that constructs it. The danger, indeed, is less than when States resort to similar expedients; yet, I shall rejoice, if, of the numerous railroads now in progress among us, some do not prove too unweildy for those who have undertaken them. The plank road is not only the adjunct, but may become the precursor, of the railroad. Nor, even as regards the ultimate effects upon the trade of a town or a city, it is certain, that the most prosperous railroad exerts a more beneficial influence than several radiating plank roads. I found the impression prevalent among the business men in Syracuse, that the plank roads terminating in that town had already been of more commercial advantage to it, than the Buffalo and Albany railroad, with all its speed and power, and the vast business it does. Whatever a plank road brings to a town remains there: what the railroad brings often passes through, without delay or discharge.

Again, after a railroad is completed, the task of its board of Directors is but commencing. Its current business requires both experience and capital, to manage it well; and upon its judicious management, quite as much as upon the judgment originally displayed in the selection of a profitable line of road, depends the pecuniary success of the enterprise. In estimating the value of railroad stock and the probable dividends therefrom, the business character of the President and of the Directory is an important item. And inasmuch as these officers may, at any time, lose their situations, and it must be uncertain by whom they will be replaced, there ever is an uncertain element in all our calculations regarding prospective railroad profits.

Not so, as to Plank Roads. The road once completed and its toll-gate-keepers stationed at their places, there is an end to all labor or responsibility, other than the trifling

care for incidental repairs, and the collection, at stated times, of the gate-money. There is no President, with his salary of three thousand a year; there are no stations costing their thousands or tens of thousands; no workshops to build and keep up; no cars, no locomotives, to buy and repair and replace; no conductors, firemen, brakemen and a long et cetera of hired operatives to employ. The Directors have but to say to the public: "The road is ready for you; use it." And the same teamsters and the same wagons, and the same horses that now struggle through mud and mire will take their places, at once, upon its smooth and graded surface. If the line is judiciously selected and the road properly constructed, it *must* pay. There is no contingency of good or bad management coming in as a disturbing element in the calculation of its expected profits.

Here, in our Western country, where practical talent capable of grasping and combining and harmonizing the complicated details of an extensive business, is not always to be had, the above considerations must be admitted to have great weight, in determining the relative value of stock, as between railways and plank roads.

As to Macadamized roads, they must now be considered out of date, except in locations where plank cannot be had, at any reasonable rate. Costing three times as much both to construct and to repair, as plank roads, their capabilities, even when in good repair, are not greater as compared to those of the latter, than as two to three. When in bad repair, as many of them are habitually kept, they are no better than the common earth-road; sometimes worse.

These common earth-roads will soon cease to be used, in our Western country, except as neighborhood and cross

roads, where the population is sparse and the amount of travel is small. The prejudice now existing against the principle of road-toll will die away, and be replaced by wonder that the present unjust system of road taxation should have been tolerated so long.* Those who use will pay, as they should do; and men who do not use and are not benefitted, will not be called off, for others' advantage, from that daily labor which is their sole dependance for support.

*I commend to those among my fellow-citizens of Indiana, who may be disposed to condemn the system of road-toll, and to prefer, in its stead, the provisions of the existing law for keeping our State and County highways in repair, a more careful perusal of that law than is usually bestowed on such enactments. It will be found among the general laws passed during the session of 1848-9, commencing at page 100.

Section 101 of that law (page 113) provides, that "the Board of County Commissioners may, at their March session in each year, assess as a road-tax on all personal and real estate subject to taxation for County and State purposes, a sum not exceeding ten cents on the one hundred dollars of the appraised value thereof, *or they may, at their discretion, dispense with any tax on real and personal property.*"

And section 106 (page 114) further provides, that "whenever the County Commissioners of any county shall dispense with any road tax on real and personal property, it shall be the duty of the Supervisors of the road districts in such county to require and notify the inhabitants of their respective districts liable to perform road labor (that is, as a general rule, all male inhabitants of the district between the ages of twenty-one and fifty years,) to work on the highways *whenever, and such number of days in each year, as shall be necessary to put and keep the highways of such district in good repair,* and at such time or times as shall be best adapted to the accomplishment of such object, assessing such labor equally upon all the inhabitants liable thereto."

No restriction as to the amount of labor; no distinction made between the man who owns ten thousand acres and the day-laborer who never called a foot of soil his own in his life; whose only property is his labor, worth fifty or seventy-five cents a day to him; who has neither horse nor wagon, nor carriage to cut up the roads, nor real estate to be advanced in value by opening or improving them. And all at the discretion of the Commissioners, who take money out of their own pockets, when they impose a heavy real-estate tax.

There is but one difficulty that may stand in the way of the rapid and universal spread of this improvement; and that is, bad legislation on the subject. Kentucky will never see plank roads multiply within her borders until her Legislature shows a little more common sense than it has hitherto done, in framing a general law on the subject. The present law, (see Appendix) permits a rate of toll full twice as high as that of New York, and nearly twice as high as that to which we are limited in Indiana; and then imposes on the stockholders the condition, equally absurd and mischievous, that they shall not divide over ten per cent. annual dividends.

Here we have the proper restriction, which would effectually protect the public, omitted; and for it is substituted another, of which the only effect, in practice, is, either to destroy enterprise or to encourage evasion of the law. This ten per cent. restriction was tried in New York and repealed. It was found, that when men were disposed to conform to it, to the letter, it effectually discouraged the making of plank roads at all; and that where these roads were made, its provisions were uniformly evaded by lavishing unnecessary expenses on the road, or, more frequently, extravagant salaries on its officers. There would be as much justice and reason, when a merchant applies for license to keep store, in granting that license only on condition that all his nett profits over ten per cent. should be paid into the State treasury, as in decreeing that the business of road-making, no matter how well managed, shall yield ten per cent. profit only. This is a direct premium on unthrift and extravagance.

Doubtless the public require protection, in such a case, against the unreasonable demands of grasping stockholders. Such protection they ought to have; but such pro-

tection, by the present Plank Road law of Kentucky, they have not. They may be required to pay five cents toll per mile for a four-horse wagon ; and ten cents per mile for every score of cattle driven along their roads. That is an imposition. Two and a half cents, or at most three cents, is all that ought to be paid for a four-horse team, and three or four cents for a score of caule. A restriction to low rates of toll is the proper protection, and the only possible protection. The other paralyzes enterprise, without protecting industry.

Wherever wisely considered, judicious laws prevail, the PLANK ROAD will become the great improvement of the West. It will remain an element, second only to the steam navigation of our noble rivers, in the prosperity, hitherto unexampled in human history, that has blessed, and is blessing, our favored country.

APPENDIX.

* * The New York General Plank Road Law is given, as being the most complete yet passed, and as having furnished the original, of which parts have been incorporated into the Plank Road Laws of most other States.

The opinion of Judge Gridley settles some important points of law in connection with this species of improvement; as, that a plank road or any other tolled road, located on the line of an old highway, still remains a public highway: and that for any damage or inconvenience suffered by any one living on the line of such a road by its *proper and necessary construction or repairs*, he can recover no damages; but for any unusual or unreasonable exercise of this right to construct and repair, the Company is liable.

NEW YORK PLANK ROAD ACT.

CHAPTER 210—LAWS OF 1847.

AN ACT to provide for the incorporation of companies to construct plank roads, and of companies to construct turnpike roads.

Passed May 7, 1847.

The people of the State of New York, represented in Senate and Assembly, do enact as follows :

1. Any number of persons not less than five, may be formed into a corporation, for the purpose of constructing and owning a plank road or a turnpike road, by complying with the following requirements : Notice shall be given in at least one newspaper, printed in each county through which said road is intended to be constructed, of the time and place or places where books for subscribing to the stock of such road will be opened ; and when stock to the amount of at least five hundred dollars for every mile of the road so intended to be built, shall be in good faith subscribed, [and five per cent. paid thereon, as hereinafter required,]* then the said subscribers may upon due and proper notice, elect directors for the said company ; and thereupon, they shall severally subscribe articles of association, in which shall be set forth the name of the company, the number of years that the same is to continue, which shall not exceed thirty years from the date of said articles, whether it is a plank road or a turnpike, which the company is formed to construct ; the amount of the capital stock of the company ; the number of shares of which the said stock shall consist ; the number of directors, and their names, who shall manage the concerns of the company for the first year, and shall hold their offices until others are elected ; the place from and to which the proposed road is to be constructed ; and each town, city and village into or through which it is intended to pass, and its length, as near as may be. Each subscriber to such articles of association, shall subscribe thereto his name and place of residence, and the number of

* The words " and five per cent. paid thereon, as hereinafter required," repealed by Chapter 250, Laws of 1849.

shares of stock taken by him in said company. The said articles of association may, on complying with the provisions of the next section, be filed in the office of the secretary of state, and thereupon, the persons who have subscribed, and all persons who shall from time to time become stockholders in such company, shall be a body corporate, by the name specified in such articles, and shall possess the powers and privileges, and be subject to the provisions contained in titles three and four of chapter eighteen, of the first part of the Revised Statutes.

2. Such articles of association shall not be filed in the office of the secretary of state, until five per cent. on the amount of the stock subscribed thereto, shall have been actually and in good faith paid, in cash, to the directors named in such articles, nor until there is endorsed thereon, or annexed thereto, an affidavit made by at least three of the directors named in such articles, that the amount of capital stock required by the first section has been subscribed, and that five per cent. on the amount has actually been paid in.

3. A copy of any articles of association filed in pursuance of this act, with a copy of the affidavit aforesaid endorsed thereon or annexed thereto, and certified to be a copy by the secretary of this state or his deputy, shall in all courts and places be presumptive evidence of the incorporation of such company, and of the facts therein stated.

4. Whenever any such company shall be desirous to construct a plank road or a turnpike road through any part of any county, it shall make application to the board of supervisors of such county at any meeting thereof legally held, for authority to lay out and construct such road, and to take the real estate necessary for such purpose; and the application shall set forth the route and character of the proposed road as the same shall have been described in the articles of association filed as aforesaid. Public notice of the application shall be given by the company previous to presenting the same to such board by publishing said notice once in each week for six successive weeks in all the public newspapers printed in such county, or in three of such newspapers if more than three are published in such county, which notice shall specify the time when such application will be presented to such board, the character of the proposed road, and each town, city and village in or through which it is proposed to construct the same.

5. If such company shall desire a special meeting of the board of supervisors for hearing the same, any three members of such board may fix the time of such meeting, and a notice thereof shall be served on each of the other supervisors of the county, by delivering the same to him personally, or by leaving it at his place of residence at least twenty days before the day appointed for such meeting. The expenses of such special meeting and of notifying the members of such board thereof, shall be paid by such company.

6. Upon the hearing of said application, all persons residing in such county, or owning real estate in any of the towns through which it is proposed to construct such road, may appear and be heard in respect thereto. Such board may take testimony in respect to such application, or may authorize it to be taken by any judicial officer of such county, and it may adjourn the hearing from time to time.

7. If after hearing such application, such board shall be of the opinion that the public interests will be promoted by the construction of such road on the proposed route as shall be described in the application, it may, if a majority of all the members elected to such board shall assent thereto, by an order to be entered in its minutes, authorize such company to construct such a road upon the route specified in the application, and to take the real estate necessary to be used for that purpose, a copy of which order certified by the clerk of such board the same company shall cause to be recorded in the clerk's office of such county before it shall proceed to do any act by virtue thereof.

8. Whenever any such board shall grant such an application, it shall appoint three disinterested persons who are not the owners of real estate in any town through which such road shall be proposed to be constructed, or in any town adjoining such town, commissioners to lay out such road; the said commissioners after taking the oath prescribed by the constitution shall proceed without unnecessary delay to lay out the route of such road in such manner as in their opinion will best promote the public interest; they shall hear all persons interested who shall apply to them to be heard, they may take testimony in relation thereto, they shall cause an accurate survey and description to be made of such route and of the land necessary to be taken by such company for the construction of such road and the necessary buildings and gates, they shall subscribe such survey and acknowledge its execution as the execution of deeds is required to be acknowledged, in order that they may be recorded, and they shall cause such survey to be recorded in the clerk's office of such county. If such company shall intend to construct its road continuously in or through more than one county, such application shall specify the number of commissioners which the company desire to have appointed to lay out such road, which shall not exceed three for each county, and an equal number of such commissioners shall be appointed by the board of supervisors of each county in or through which it shall be proposed to construct such road, but the whole number of such commissioners shall not be less than three, nor without the consent of such company shall it exceed six, unless the number of counties in or through which it is proposed to construct such road shall exceed that number. And the commissioners so appointed shall lay out the whole of such road, and shall make out a separate survey of so much thereof as lies in each county;

which shall be subscribed and acknowledged as aforesaid and recorded in the county clerk's office of such county.* Such company shall pay each of the said commissioners two dollars for every day spent by him in the performance of his duties as such commissioner, and his necessary expenses.

9. No such road shall be laid out through any orchard to the injury or destruction of fruit trees, or through any garden without the consent of the owner thereof, if such orchard be of the growth of four years or more, or if such garden has been cultivated four years or more before the laying out of such road, nor shall any such road be laid out through any dwelling house or buildings connected therewith, or any yards or enclosures necessary for the use and enjoyment of such dwelling without the consent of the owner, nor shall any such company bridge any stream where the same is navigable by vessels or steamboats, or in any manner that will prevent or endanger the passage of any raft of twenty-five feet in width.

10. No plank road shall be made on the roadway of any turnpike company without the consent of such company, and any plank road company formed under this act shall have power to contract with any turnpike company for the purchase of the roadway or part of the roadway of such turnpike company on such terms as may be mutually agreed on; whenever a plank road shall be made as provided in this act on or adjoining the route of any turnpike road, the company owning such turnpike road is authorized to abandon that portion of their road on or adjoining the route of which a plank road is actually constructed and used; but nothing herein contained shall be so construed as to prevent any plank road from crossing any turnpike road, nor any turnpike road from crossing any plank road.

11. The route so laid out and surveyed by the said commissioners shall be the route of such road, and such company may enter upon, take and hold, subject to the provision of this act, all such lands as the said survey shall describe as being necessary for the construction of such road and the necessary buildings and gates. But before entering upon any of such lands, the company shall purchase the same of the owners thereof, or shall, pursuant to the provisions of this act, acquire the right to enter upon, take and hold the same.

12. If any owner of such land shall from any cause be incapable of selling the same, or if such company cannot agree with him for the purchase thereof, or if after diligent inquiry the name or residence of any such owner cannot be ascertained, the company may present to the first

* By Chapter 260 of the laws of 1848, this section is so amended as to authorize the commissioners to determine the distance that the outer limits of the road shall be apart, not however to be more than four rods.

judge or county judge of the county in which the lands of such owner lie, a petition setting forth the grounds of the application, a description of the lands in question and the name of the owner if known, and the means that have been taken to ascertain the name and residence of such owner, if his name and residence have not been ascertained, and praying that the compensation and damages of the owner of the lands described in the petition may be ascertained by a jury. Such petition shall be verified by the oaths of at least two of the directors of the company, and if it shall alledge that the name or residence of any owner is unknown, it shall be accompanied by affidavits proving to the satisfaction of the said judge that all reasonable efforts have been made by the company to ascertain the name and residence of any owner whose name or residence is unknown.

13. On receiving such petition, the said judge shall appoint a time for drawing such jury, which shall be drawn from the grand jury box of the county by the clerk thereof, at his office. At least fourteen days notice of the time and place of such drawing shall be served personally upon each owner of lands described in the petition, who shall be known and reside in the county where the lands lie or by leaving the same at his residence, and such notice shall be served on all other owners in the manner aforesaid or by putting the same into the post office directed to them at their respective places of residence and paying the postage thereon, or by publishing the same once in each week for two successive weeks in a newspaper printed in such county, the first of which publications shall be at least fourteen days before such drawing.

14. In case any lands described in such petition shall be owned by a married woman, infant, idiot or insane person, or by a non-resident of the state, the said judge shall appoint some competent and suitable person having no interest adverse to such owner to take care of the interests of such owner in respect to the proceedings to ascertain such compensation and damages. And all such notices as are required to be served on any owner residing in such county, shall be served upon the person so appointed in like manner as on such owner; but any person so appointed to take care of the interests of any such non-resident may be superseded by him.

15. The said judge shall attend such drawing and shall decide upon any challenge made to any juror drawn by any person interested. Twenty-four competent and disinterested jurors, and as many more as the said judge shall direct, shall be drawn; the clerk shall make, certify and deliver to the judge and to any party requiring the same a list of them, and the ballots drawn shall be returned to the box. The said judge, if he shall deem it necessary, may at any subsequent time direct the drawing of an additional number of jurors, and they shall be drawn,

and all proceedings in relation to such drawing shall be had in the manner hereinbefore provided. Before proceeding to draw any such jury the company shall furnish to the said judge proof by affidavit satisfactory to him, of the time and manner of serving and publishing notice of such drawing, which affidavit shall be filed in such clerk's office; and no such jury shall be drawn unless it appear to the satisfaction of the said judge that the provisions of this act in respect to giving notice of such drawing have been complied with.

16. From the jurors so drawn the said judge shall draw as many as he shall deem necessary to secure the attendance of twelve, and he shall issue his precept directed to the sheriff of such county, either of his deputies or any constable of such county to summon the jurors so drawn by the said judge, to attend at the time and place therein specified to ascertain such compensation and damages. And he may from time to time, in case of the absence or inability to serve of any juror directed to be summoned, draw and direct to be summoned as aforesaid, as many as may be necessary in his opinion to secure the attendance of twelve.

17. Every juror named in any such precept, shall, at least four days before the day therein specified for his attendance, be summoned personally, or by leaving at his residence, a notice containing the substance of such precept. The officer serving such precept, shall return it to the said judge, with an affidavit of the manner of serving the same, and of the distance necessarily traveled by him for that purpose; and such officer shall receive for making such service, six cents a mile for the distance so traveled.

18. Every juror so summoned, who shall neglect or refuse to attend or serve, in pursuance of such summons, shall be liable to the same penalties, as in case of such neglect or refusal of a person duly summoned as a juror in a court of record, and may be excused by the said judge from attending or serving, for reasons for which such juror might be so excused if summoned as a juror in such court. Every juror attending, shall be entitled therefor to one dollar a day, and his reasonable and necessary expenses to be paid by the company.

19. On the application of any party interested, any judge or justice of the peace, may issue a subpoena requiring witnesses to attend before such jury, and such subpoena shall have the same force and effect; and witnesses duly subpoenaed by virtue thereof, and refusing or neglecting to obey the same, shall be subject to the same penalties and liabilities as though such subpoena were issued from a court of record, in a suit pending therein.

20. The time and place of meeting of the jury, to ascertain such compensation and damages, may be fixed by the said judge, by an order to be made by him at any time after receiving such petition; and notice

thereof shall be served on the owners whose lands are described in the petition, as follows; on any owner residing in the county, or within fifteen miles of the lands in question owned by him, personally, or by leaving the same at his residence, at least fourteen days before the time so fixed; on any other owner residing within this state, and whose residence is known, in the manner aforesaid, or by putting the notice into the post office directed to him at his place of residence, and paying the postage thereon; on any owner residing out of the state, and not within fifteen miles of the lands in question, owned by him, by putting the notice in the post office directed and paid as aforesaid, at least forty days before the time so fixed; and on owners whose residence is unknown, by publishing the notice once in each week for six successive weeks, in one of the public newspapers printed in the county.

21. The jurors so summoned shall meet at the time and place fixed by the said judge for that purpose, and shall be sworn by him to diligently enquire and ascertain the compensation and damages which ought justly to be paid for the land described in the petition, or for those of them in respect to which they shall be called upon to enquire, to the owners thereof, and for taking the same for such road, and faithfully to perform their duty as such jurors, according to law.

22. The said judge shall attend such jurors, shall administer oaths to witnesses called before them, shall take minutes of the testimony given, and admissions of the parties made before them, shall advise such jury as to the law applicable to any case that may arise, shall receive, certify and return to the county clerk's office, the verdicts agreed upon by them, and while so attending, shall have all the powers possessed by a court of record, when trying issues of fact joined in civil cases.

23. The jury, after hearing the parties, and viewing the lands in question, in each case, shall, by a verdict, ascertain and determine the compensation and damages that ought to be paid to the owner for the land to be taken by the company, and for taking the same for such road, and also the amount that ought to be paid to him for the time spent, and necessary expenses incurred by him in respect to the proceedings, to ascertain and determine such compensation and damages, of which time and expenses, a bill of items shall be presented to the jury, verified by the oath of the owner or his agent, and such compensation and damages shall be ascertained and determined without any deduction on account of any real or supposed benefit, which the owners of such lands may derive from the construction of such road.

24. Such jury shall not proceed to a hearing in any case until the company shall have produced to the said judge, satisfactory proof by affidavit that the notice of the meeting of the jury has been given in such case, according to the provisions of this act; and such affidavit shall be

attached to and filed with the certificate of the verdict in the case. And on any such hearing, no evidence or information shall be given, nor any statement made to the jury, of any proposition by, or negotiation between the parties or their agents, in respect to any such lands, or such compensation or damages, nor shall any such petition contain any such statement or information.

25. Such jury, finding any such verdict, shall, after agreeing upon the same, make a certificate thereof, and sign and deliver the same to the said judge; and shall embrace therein a particular description of the land, in respect to which it is found. Such certificate may include one or more verdicts, in the discretion of the jury. Every such certificate shall be certified by the judge to have been made by such jury; and shall be recorded in the records of deeds, in the clerk's office of the county where the lands therein described shall lie, at the expense of the company.

26. Whenever it shall become necessary for any such company to use any part of a public highway for the construction of a plank or turn-pike road, the supervisor and commissioners of highways of the town in which such highways is situated, or a majority, if there be more than one such commissioner in such town, may agree with such company upon the compensation and damages to be paid by said company, for taking and using such highway for the purposes aforesaid. Such agreement shall be in writing, and shall be filed and recorded in the town clerk's office of such town. In case such an agreement cannot be made, the compensation and damages for taking such highway for such purpose, shall be ascertained in the same manner as the compensation and damages for taking the property of individuals. Such compensation and damages shall be paid to the said commissioners, to be expended by them in improving the highways of such town.

27. Any party interested in any such verdict, may, within twenty days after being notified of the rendition thereof, apply to the supreme court for a new trial, and it may be granted upon such terms as to the costs of the application and of the first trial, as that court shall deem reasonable. If a new trial shall be granted, a jury shall be drawn therefor, and the same proceedings shall be had as are hereinbefore provided.

28. Within forty days after the rendition of any such verdict, if a new trial shall not be applied for, the company shall pay to the person entitled to receive the same the amount thereof, or shall make a legal tender thereof to him, if he shall refuse to receive the same; and the company may thereupon enter upon the lands in respect to which such verdict was rendered, and take and hold the same to it and its assigns, so long as it shall be used for the purposes of such a road as such company was formed to construct.

29. If any person entitled to receive the amount of any such verdict be not a resident of this state, or cannot be found therein after diligent search, the company may furnish to the said judge satisfactory proof, by affidavit, of such fact, and he shall thereupon make an order that the amount of such verdict be paid to the treasurer of the county in which the lands lie, in respect to which such verdict was found for the use of such owner, and that notice of such payment shall be given by publishing the same once in each week, for six successive weeks in a newspaper published in the county. On satisfactory proof being made to the said judge, by affidavit, within three months from the time of making the last mentioned order, of such payment and publication, he shall make an order authorizing the company to take and hold the land in respect to which such verdict was rendered, in the same manner and with the same effect as if such payment had been made to the owner personally. The affidavit and orders mentioned in this section, and all other affidavits and orders made, and precepts issued in the course of the proceedings under this act, in relation to the acquisition of the land to be used for such road, shall be filed in the county clerk's office, and all such orders shall be recorded by such clerk in the records of deeds, at the expense of the company.

30. If any owner shall apply for a new trial, the company, upon depositing the amount of the verdict sought to be set aside, in such manner as the said judge shall, upon hearing the parties, direct, in trust that the same or so much thereof as the said owner shall be entitled to receive, shall be paid to him on demand, and on giving such security, by bond, as the judge shall approve, for the payment to such owner of any sum which he may be entitled to receive from the company, in respect to the land in question, by reason of any verdict or the judgment of any court, for such compensation, damages, costs and expenses, the company may enter upon and use such lands for the purposes of such road, but the title of the owner thereof shall not be divested until the payment or legal tender to him of the whole amount which he shall be entitled to receive from the company for such compensation, damages, costs and expenses; and on such payment or tender being made, the company shall be entitled to take and to hold such lands to it and to its assigns so long as the same shall be used for the purposes of such a road as such company was formed to construct.

31. Every plank road made by virtue of this act, shall be laid out at least four rods wide,* and shall be so constructed as to make, secure and

* By Chapter 360, laws of 1848, the commissioners are authorized to determine the width. By Chapter 250, of laws of 1849, Section 7, the inspectors are authorized to determine the width, in case the same has not been determined by the commissioners, but in no case are the outer limits to be more than four rods apart without the voluntary sale of the land by the owner.

maintain a smooth and permanent road, the track of which shall be made of timber, plank or other hard material, so that the same shall form a hard and even surface, and be so constructed as to permit carriages and other vehicles conveniently and easily to pass each other, and also so as to permit all carriages to pass on and off where such road is intersected by other roads.

32. Every turnpike road that shall be constructed by virtue of this act, shall be laid out at least four rods wide; and shall be bedded with stone, gravel or such other materials as may be found on the line thereof, and faced with broken stone or gravel, so as to form a hard and even surface, with good and sufficient ditches on each side wherever the same is practicable. The arch or bed of such road shall be at least eighteen feet wide, and shall be so constructed as to permit carriages and other vehicles conveniently to pass each other, and to pass on and off such turnpike where it may be intersected by other roads.

33. In each county of this state, in which there shall be any plank road, or turnpike road, constructed by virtue of this act, there shall be three inspectors of such roads, who shall not be interested in any plank or turnpike road in such county. They shall be appointed by the board of supervisors of the county, and shall hold their offices during the pleasure of such board. Before entering on their duties, such inspectors shall take and subscribe the constitutional oath of office, and file the same in the office of the clerk of the county.

34. Whenever any such company shall have completed their road, or any five* consecutive miles thereof, it may apply to any two of the inspectors to be appointed pursuant to this act, in the county where said road or a part thereof, so completed and to be inspected is located, to inspect the same; or if such inspectors, or a majority of them, are satisfied on inspection, that the road so inspected is made and completed according to the true intent and meaning of this act, they shall grant a certificate to that effect, which shall be filed in the office of the county clerk. The inspectors shall be allowed two dollars per day for their services pursuant to this section, to be paid by the company whose road they inspect.

35. Upon filing as aforesaid such certificate, the company owning any plank road so inspected, may erect one or more toll gates upon their road, but not within three miles of each other, and may demand and receive toll, not exceeding one and a half cents per mile for any vehicle drawn by two animals, and for any vehicle drawn by more than two animals, one-half cent per mile for every additional animal; for every vehicle drawn by one animal, three-quarters of a cent per mile; for

* By Chapter 250, of laws of 1849, Section 4, it is provided that when three consecutive miles are completed, the inspectors may be called on, &c.

every score of sheep or swine, and for every score of neat cattle, one cent per mile; for every horse and rider, or led horse, half a cent per mile. [In no case shall any plank road company charge or receive rates of toll which will enable said company to divide more, nor shall any company divide more than ten per cent. per annum on their capital stock actually paid in and invested in their road after keeping the road in repair, and appropriating not exceeding ten per cent. per annum on their capital stock actually paid in and invested in their road after keeping the road in repair, and appropriating not exceeding ten per cent. per annum on their capital stock invested as aforesaid, as a fund for the reconstruction of their road when necessary.]*

36. Upon filing such certificate as aforesaid, the company owning any turnpike road so inspected, may erect one or more toll gates upon its road, but not within three miles of each other, and may demand and receive toll not exceeding the following rates: For every vehicle drawn by one animal, three-quarters of a cent a mile; for every vehicle drawn by two animals, one and one-quarter cents a mile; and for every vehicle drawn by more than two animals, one and one quarter cents a mile; and one quarter cent additional a mile for every animal more than two; for every score of neat cattle, one cent a mile; for every score of sheep or swine, one-half cent a mile; and in the same proportion for any greater or less number of neat cattle, sheep or swine; for every horse and rider, or led horse, one-half cent a mile; and in no case shall any such turnpike company charge or receive rates of toll which will enable it to divide more than twelve per cent on its capital stock actually paid in, in cash, and invested in its road, after paying the expenses of managing the same, and keeping it in repair.

37. The commissioners of highways of any town in which a toll gate may be located on any such road, or in an adjoining town, whenever they or a majority of them, shall be of the opinion that the location of such gate is unjust to the public interest, by reason of the proximity of diverging roads, or for other reasons, may on at least fifteen days written notice to the president or secretary of the said company, apply to the county court of the county in which such gate is located, for an order to alter or change the location of the said gate; the court, on such application, and on hearing the respective parties, and on viewing the premises, if the said court shall deem such view necessary, shall make such order in the matter, as to the said court may seem just and proper; and either party may, within fifteen days thereafter, appeal from such order to the supreme court, on giving such security as said county judge shall require; such order, unless appealed from, shall be observed by the respective parties, and may be enforced by attachment or otherwise, as the

* Repealed by Chapter 250 of laws of 1840, section 6.

said court shall direct: And if appealed from, the decision of the supreme court, may direct the payment of costs in the premises, as shall be deemed just and equitable.

38. The business and property of such company, shall be managed and conducted by a board of directors, consisting of not less than five nor more than nine, who, after the first year, shall be elected at such time and place as shall be directed by the by-laws of such corporation, and public notice shall be given of the time and place of holding such election, not less than twenty days previous thereto, in a newspaper printed in each county in or through which the road of such company is located; the election shall be made by such of the stockholders as shall attend for that purpose, either in person or by proxy; all elections shall be by ballot, and each stockholder shall be entitled to as many votes as he shall own shares of stock, and the persons having the greatest number of votes, shall be directors; whenever any vacancy shall happen in the board of directors, such vacancy shall be filled for the remainder of the year by the remaining directors; the directors shall hold their office for one year and until others are elected in their places; no person shall be a director unless he is a stockholder in the company, and no stockholder shall be permitted to vote at an election for directors, on any stock except such as he has owned for the thirty days next previous to the election.

39. The directors of any company incorporated under this act, may require payment of the same subscribed to the capital stock, at such times and in such proportions, and on such conditions as they shall see fit, under the penalty of the forfeiture of their stock, and all previous payments thereon; and they shall give notice of the payments thus required, and of the place and time, when and where the same are to be made, at least thirty days previous to the payment of the same, in one newspaper printed in each county, in or through which their road is located, or by sending such notice to such stockholder by mail, directed to him at his usual place of residence.

40. The shares of any company formed under this act, shall be deemed personal property, and may be transferred as shall be prescribed by the by-laws of such company; the directors of every such company, may, at any time, with the consent of a majority, in amount, of the stockholders in such company as may be necessary to finish the making of a road actually commenced and partly constructed, but the whole capital stock of any company, shall not exceed five thousand dollars per mile, for each mile of road.

41. It shall be the duty of the directors of every company formed under this act, to report annually, to the secretary of state, under the oath of any two of such directors, the cost of their road, the amount of all

money expended, the amount of their capital stock, and how much paid in, and how much actually expended; the whole amount of tolls or earnings expended on such road; the amount received during the year, for tolls, and from all other sources, stating each separately, the amount of dividends made, and the amount set apart for a reparation fund, and the amount of indebtedness of such company, specifying the object for which the indebtedness accrued.

42. Within two weeks after the formation of any company, by virtue of this act, the directors thereof shall designate some place within a county in which, according to the articles of association of such company, its roads, or some part thereof, is to be constructed, as the office of such company; and shall give public notice thereof, by publishing the same in a public newspaper, published in such county, which publication shall be continued once in each week, for three successive weeks, and shall file a copy of such notice in the office of the county clerk of every county, in which any part of such road is constructed or is to be constructed. And if the place of such office shall be changed, like notice of such change shall be published and filed as aforesaid, before it shall take place, in which notice, the time of making the change shall be specified. And every notice, summons, declaration or other paper required by law to be served on such company, may be served by leaving the same at such office with any person having charge thereof, at any time between nine o'clock in the forenoon and noon, and between two and five o'clock in the afternoon, of any day except Sunday.

43. It shall be the duty of the directors of any such company, to cause a book to be kept by the secretary, treasurer or clerk thereof, containing the names of all persons alphabetically arranged, who are, or shall, within six years, have been, stockholders of such company, and showing their places of residence, the number of shares of the stock held by them respectively, and the time when they respectively become the holders of such shares; which book shall, from nine o'clock in the forenoon until noon, and from two o'clock in the afternoon until five, on every day except Sunday and the fourth day of July, be open for the inspection of all persons who may desire to examine the same, at the office of such company, and any and every person, shall have the right to make extracts from such book, and no transfer of stock shall be valid for any purpose whatever, except to render the person to whom it shall be transferred, liable for the debts of the company, according to the provisions of this act, until it shall have been entered therein, as required by this section, by an entry showing to and from whom transferred. Such book shall be presumptive evidence of the facts therein stated, in favor of the plaintiff in any suit or proceeding against such company or against any one or more stockholders, or against such company and one or more

stockholders jointly. Every officer or agent of any such company, who shall neglect to make any proper entry in such book, or shall refuse or neglect to exhibit the same, or allow the same to be inspected and extracts to be taken therefrom, as provided by this section, shall be deemed guilty of a misdemeanor, and the company shall forfeit and pay to the party injured, a penalty of fifty dollars for every such neglect or refusal, and all the damages resulting therefrom. And every company that shall neglect to keep such a book open for inspection as aforesaid, shall forfeit to the people the sum of fifty dollars for every day it shall so neglect, to be sued for and recovered in the name of the people, by the district attorney of any county in or through which the road of such company shall be constructed, or shall be, according to its articles of association, intended to be constructed, and when so recovered, the amount shall be paid in equal portions to every such county for the use thereof.

44. The stockholders of every company incorporated under this act, shall be liable in their individual capacity for the payment of the debts of such company, for an amount equal to the amount of the stock they have severally subscribed or held in said company over and above such stock, to be recovered of the stockholder who is such, when the debt is contracted, or of any subsequent stockholder, and any stockholder who may have paid any demand against such company, either voluntarily or by compulsion, shall have a right to resort to the rest of the stockholders who were liable to contribution; and the dissolution of any company shall not release or affect the liability of any stockholder which may have been incurred before such dissolution.

45. The debts and liabilities of any company formed under this act, shall not exceed in amount, at any one time, fifty per cent. of the amount of its capital, actually paid in, and if such debts and liabilities shall at any time exceed such amount, the stockholders who were such, at the time any excess of debts or liabilities shall be created or incurred, shall be jointly and severally, individually liable for such excess, in addition to their other individual liability, as provided in this act.

46. In any action against any company formed under the provisions of this act, the plaintiff may include as defendants, any one or more of the stockholders of such company, who shall by virtue of the provisions of this act, be claimed to be liable to contribute to the payment of the plaintiff's claim; and if judgment be given against such company, in favor of the plaintiff for his claim or any part thereof and any one or more of the stockholders so made defendants, shall be found to be liable as aforesaid, judgment shall also be given against him or them, and shall show the extent of his or their liabilities individually. The execution upon such judgment shall direct the collection of the sum for which it may be issued, of the property of such company liable to be

levied upon by virtue thereof; and in case such property sufficient to satisfy the same, cannot be found in the county of the officer to whom the same shall be directed, that the deficiency, or so much thereof as the stockholders who shall be defendants in such judgment shall be liable to pay, shall be collected of the property of such stockholders respectively. And if in any such action, any one or more of such stockholders shall be found not to be liable for the demand of the plaintiff or any part thereof, judgment shall be given for the stockholders so found not to be liable; but no verdict or judgment in favor of any such stockholder, shall prevent the plaintiff in such action from proceeding therein against the company alone, or against it, and such defendants who are stockholders as shall be liable for such demand or some portion thereof. Suits may be brought against one or more stockholders who are claimed to be liable for any debt owing by the company, or any part of such debt, without joining the company in such suit; but no such suit shall be so brought, until judgment on the demand shall have been obtained against the company and execution thereon returned unsatisfied in whole or in part, or the company shall have been dissolved; but it shall not be necessary that such dissolution shall have been declared by any judicial decree, sentence or determination; and in such suit there may be a verdict and judgment in favor of any defendant not liable as aforesaid; but such verdict and judgment shall not prevent the plaintiff in such suit from proceeding therein against any such defendant who shall be liable as aforesaid.

47. Sections seven, eight, nine, eleven, twelve, thirteen, fourteen, sixteen, twenty-one, twenty-two, twenty-three, twenty-four, thirty, thirty-five, thirty-six, forty-one, forty-two, forty-four, forty-five, forty-six, forty-seven, forty-eight, forty-nine, fifty, fifty-one and fifty-two of the first title of the eighteenth chapter of the [third*] part of the Revised Statutes, shall apply to the companies organized by virtue of this act, and all inspectors and other officers named therein and to all the officers and roads of such companies, so far as the same can be so applied and are consistent with this act.

48. So much of any such road and of the toll-houses, gates and other appurtenances thereof constructed by virtue of this act, as shall be within any town, city or village shall be liable to taxation in such town, city or village as real estate.

49. Every company incorporated under this act shall cease to be a body incorporate:

1. If within two years from the filing of their articles of association,

* Amended by chap. 287 of laws of 1847, so as to read "FIRST" instead of "THIRD," and the only effect of chap. 287, is to correct this error.

they shall not have commenced the construction of their road, and actually expended thereon at least ten per cent. of the capital stock of such company, and

2. If within five years from such filing of the articles of association, such road shall not be completed according to the provisions of this act.

50. All companies formed under this act shall at all times be subject to visitation and examination by the legislature or by a committee appointed by either house thereof, or by any agent or officer in pursuance of law; and the courts of this state shall have the same jurisdiction over such corporations and their officers as those created by special acts.

51. The legislature may at any time alter, amend or repeal this act, or may annul or repeal any corporation formed or created under this act.

52. This act shall take effect immediately.

CHAPTER 398—LAWS OF 1847.

AN ACT in relation to Plank Road and Turnpike Companies.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

1. Any company formed under the provisions of chapter 210 of the laws of 1847, entitled "An act to provide for the incorporation of companies to construct plank roads and companies to construct turnpike roads," may procure by purchase or gift from the owners thereof, any lands necessary for the construction of so much of its contemplated road as shall be intended to be constructed in any county. And may also procure by agreement from the officers named in the 26th section of the said chapter, the right to take and use any part of any public highway necessary for the construction of so much of said road as shall be intended to be constructed in such county; and when any such company shall have so procured all the lands necessary to be used for the construction of its road in such county, and the right to take and use such parts of the public highways as shall be necessary for that purpose, such company may construct so much of its road as shall be intended to be constructed in such county, without making the application mentioned in the fourth section of the said chapter.

2. Before proceeding to construct such part of its road as provided in the first section of this act, such company shall cause an accurate survey of such part to be made by a practical surveyor, signed by its president and secretary, acknowledged by them as conveyances of real estate are required to be acknowledged in order to be recorded, and recorded in the clerk's office of such county; and it shall also, before proceeding to construct such part of its road, procure in manner provided by the said chapter, from the board of Supervisors of every other county, if any there be, in which any portion of it is intended to be constructed, author-

ity to construct the same through such other county; but in such case, the commissioners appointed to survey and lay out the road of such company, shall not be required to survey and lay out that portion of it intended to be constructed within the county, in which such company shall procure the lands, and the right to take and use the public highways necessary for its construction as aforesaid.

3. When any such company, by virtue of the provisions of this act, shall have procured the lands and the right to take and use the parts of any public highways necessary to construct its road in any county, and shall have constructed the same without making the application mentioned in the fourth section of the said chapter, it shall possess the same rights, powers and privileges and be subject to the same duties and liabilities in respect to its road and to the part thereof so constructed, as if such application had been made and all the proceedings of such company had been had pursuant to the provisions of the said chapter.

4. Nothing in this act contained, shall be deemed or construed to authorize the laying out or constructing of any road in the cases specified in section nine of chapter 210 of the laws of 1847, nor to authorize the bridging or obstructing of any stream navigable by vessels or steamboats.

CHAPTER 360—LAWS OF 1848.

AN ACT to amend an act entitled "An act to provide for the incorporation of companies to construct plank roads, and companies to construct turnpike roads," passed May 7th, 1847.

Passed April 12th, 1848.

The people of the State of New York represented in Senate and Assembly, do enact as follows :

1. The commissioners appointed by the board of supervisors, as provided in the eighth section of the act to provide for the incorporation of companies to construct plank roads, and of companies to construct turnpike roads, passed May 7th, 1847, are hereby authorised in laying out a plank road to determine the distance that the outer limits of the road shall be apart, as they may judge necessary, provided, in no case shall the company take more than four rods in width, except by the voluntary sale of the same to the company.

2. Any company formed under this said act, may take half the rates of tolls, and no more, provided for in said act, from persons living within one mile of the gate at which it is taken; but no tolls shall be taken from farmers going to and from their work on their farms.

CHAPTER 250—LAWS OF 1849.

AN ACT in relation to plank roads and turnpike roads.

Passed April 6, 1849.

The People of the State of New York represented in Senate and Assembly do enact as follows :

SECTION 1. The directors of any plank road company formed under the act passed May 7, 1849, entitled "an act to provide for the incorporation of companies to construct plank roads, and for companies to construct turnpike roads," may with the written consent of a majority of the inspectors, whose appointment is provided for in the 23d* section of said act, construct branches to their main line of road, or extend their main line, or change the rout of their road, or any part thereof, which branches or extensions shall in all respects be governed by the same rules and affected by the same laws as the main line of road, and the said directors may increase the capital stock of the company to an amount not exceeding two thousand dollars a mile of such branches or extensions for their construction, and distribute the certificates therefor among the stockholders of the company in proportion to the stock owned by them severally, if such stockholders shall demand and pay up the same; and in case the new stock, after the directors have given public notice in some newspaper printed in every county in which their road is situated, for six successive weeks, is not demanded and paid by the stockholders, they may permit any person or persons to subscribe and pay on the new stock the same per centage that had been paid on the original stock of the company, and the same shall in all respects be held and considered as though it had formed a part of the original stock of the company. The right of way for any such branches or extensions shall be acquired by the company in the same manner as is now provided by law for plank road companies to acquire the right of way for their roads.

2. The following persons and no others, shall be exempt from the payment of tolls at the gates of the several plank road companies, formed under the before mentioned act:

NOTE.—By chap. 250, laws of 1849, section 7, the inspectors of plank roads are authorized to determine the outer limits of plank roads, in the cases where the commissioners have not done so. In all the cases of companies purchasing the right of way, either from individuals or from supervisors and commissioners of highways of towns, as provided for by chap. 398—laws of 1847—it is not necessary to have commissioners appointed by the board of supervisors to lay out the roads; but inspectors must certify the road to be properly made, before tolls can be taken; they can determine the width at that time or any time thereafter.

* This reference to the 23d section should be the 33d section. The error was probably made in writing out the bill by the clerk. The seventh section of this act makes the reference to the 33d section, as it should be.

1. Persons going to or from any court to which they have been summoned as jurors; or to which they have been subpoenaed as witnesses.

2. Persons going to or from any training at which they are by law required to attend.

3. Persons going to or from religious meetings.

4. All persons going to or from any funeral, and all funeral processions.

5. Persons living within one mile of any gate, shall be permitted to pass the same at one-half the usual rates of toll, excepting farmers going to or returning from their work on their farms, who shall go free, when not employed in the transportation of persons or property of other persons.

6. Troops in the actual service of this state or of the United States.

7. Persons going to any town meeting or election, at which they are entitled to vote, for the purpose of voting and returning therefrom.

3. Any person falsely representing him or herself to any toll gatherer as being entitled to any of the exemptions mentioned in the preceding section of this act, shall forfeit to the company, to be recovered in the corporate name of the company, in any justice's court, the sum of ten dollars.

4. Whenever any plank road company formed under the before mentioned act, shall have finished their road, or any three consecutive miles thereof, and had the same inspected as provided in the before mentioned act, it shall be lawful to erect a toll gate thereon, and exact tolls thereat for a term not exceeding one year, unless such road, or five consecutive miles thereof, be completed within such year.

5. Sections fifty-four, fifty-five and fifty-six of part first, title first, chapter eighteen of the Revised Statutes shall apply to all companies formed under the before mentioned act, passed May 7, 1847, so far as the same can be applied, and are not inconsistent with this act.

6. So much of section thirty-five of the aforesaid act, passed May 7, 1847, as provides that "in no case shall any plank road company charge or receive rates of toll which will enable said company to divide more, nor shall any company divide more than ten per cent. per annum on their capital stock actually paid in and invested in their road, after keeping the road in repair, and appropriating not exceeding ten per cent. per annum on their capital stock invested as aforesaid, as a fund for the reconstruction of their road when necessary, is hereby repealed.

7. The inspectors, or a majority of them, whose appointment is provided for by the thirty-third section of the said act, passed May 7, 1847, are hereby authorised to determine the distance that the outer limits shall be apart, of any plank road or any turnpike road, belonging to any company formed under said act, in case the same has not been deter-

mined by the commissioners appointed under the eighth section of said act: provided, that in no case shall the company take more than four rods in width, except by the voluntary sale of the same to the company.

8. It shall be lawful for any two or more companies, formed under the provisions of the aforesaid act of 1847, to consolidate the respective companies, on such terms as the persons owning two-thirds of the stock of each of said companies may agree upon; and such company, consolidated as aforesaid, may change the name of their road, on filing in the office of the secretary of state, a certificate containing the names of the roads so consolidated and the name by which such road shall thereafter be known.

9. Any person who shall pass any plank road gate, or turnpike gate, without paying the toll, and with the intent to avoid the payment of the same, by which a penalty accrues, or any person committing any depredation or trespass on any plank road or turnpike, may be sued for said penalty or trespass in the county where such offence or trespass was committed, or in the county where such person may reside.

10. Whenever a complaint shall be made to the inspector or inspectors of any plank road or turnpike in this state, before such inspector or inspectors shall act upon such complaint, he or they shall receive from the complainant the fees provided by law; and in case it shall appear, upon examination of the road, that the complaint was well founded, the amount of said fees shall be paid to the complainant by the company. In case it is determined that the complaint was not well founded, the complainant shall not be entitled to receive back the fees so paid by him.

11. Whenever any plank road or turnpike road shall be built in pursuance of the provisions of this act, or the act hereby amended, upon the site of an old highway, it shall be the duty of the commissioners of the highways of the town where such road shall be made, to designate some district or districts within their town, on which the highway labor of the inhabitants residing along the line of said plank or turnpike shall be performed.

12. It shall be lawful for the inhabitants residing in any road district in this state, to grade, gravel or plank the road or roads in such district, by anticipating the highway labor of such road district for one or more years and applying it to the immediate construction of such plank or gravel road, and after the completion of such plank or gravel road, the said inhabitants shall be exempted from the labor so anticipated and applied, except so far as their labor may be necessary to keep their said road or roads in repair: such road to be in all cases a free road.

13. Section first of chapter 201, of the laws of 1847, is amended by striking out in the tenth and eleventh lines, the words, "and five per cent. paid thereon as hereinafter required."

INDIANA PLANK ROAD ACT.

CHAPTER I.

AN ACT authorising the construction of Plank Roads.

Passed January 15, 1849.

SECTION 1. *Be it enacted by the General Assembly of the State of Indiana,* That any number of persons may form themselves into a corporation for the purpose of constructing and owning a plank road by complying with the following requirements: They shall unite in articles of association setting forth the name which they assume—the line of the route and the places to and from which it is proposed to construct the road—the amount of capital stock and the number of shares into which it is to be divided. The names and places of residence of the subscribers and the amount of stock taken by each shall be subscribed to said articles of association. Whenever the stock subscribed amounts to fifteen hundred dollars per mile of the proposed road, copies of the articles of association shall be filed in the office of the recorder of each county through which the road is to pass.

SEC. 2. Not less than three nor more than seven directors shall be elected by the stockholders of every such corporation, who shall hold their offices for one year and until their successors are in like manner elected. Notice of the first election for directors shall be given by two weekly publications in some newspaper printed on or near the route of the road.

SEC. 3. The directors may determine the particular manner of construction so as to secure and maintain a smooth and permanent road, the track of which shall be made of plank, or timber or other hard material so that the same shall form a hard and even surface.

SEC. 4. The directors of said company shall proceed to locate and lay out said road, and may, with the consent of the Board of County Commissioners of the county, locate the same over and upon any state or county road or other public highway, and thereupon such state or county road or other public highway, or such portion thereof as may be so occupied and appropriated by said company, shall be and become the

property of said company for the purpose of making and maintaining said road and the gates and toll houses thereon; and the Boards of County Commissioners of the several counties of this state are hereby authorized to give their consent to the appropriation and occupation of any such state or county road or other public highway, over and upon which any such company may locate any such road.

SEC. 5. Any such company may take releases and conveyances of the necessary lands of any and all persons over whose lands the road may be located, and any such releases or conveyance may be made and executed by any infant, feme covert, guardian, executor or administrator, and shall be valid and effectual in law, by obtaining the consent of the proper probate court thereto.

SEC. 6. For the purpose of locating and constructing said road, it shall be lawful for such company, by their agents or persons in their employ, to enter upon any lands to make surveys and estimates, and to take from the land occupied by said road any stone, gravel, timber, or other materials necessary to construct said road and the bridges thereon.

SEC. 7. If any person owning lands over and upon which such road shall be located shall refuse to relinquish the same for the use of said road, and no satisfactory contract can be made by such company with such owner therefor, it shall be lawful for such company to give notice to some justice of the peace of the proper county, and such justice shall thereupon summon the owner of such land, if a resident of the county, to appear before him on a day to be named therein, and within ten days thereafter, and if the parties cannot then agree, said justice shall issue a venire for summoning before him a jury of three disinterested men of the county, to be selected by said justice, and such jury, after having taken an oath or affirmation faithfully and impartially to assess the damages, if any, shall view the lands upon which such damages are claimed, and shall determine the same, duly considering the advantages of said road to said owner, and shall make report thereof to said justice, whereupon he shall enter judgment upon such report, from which judgment [either party] may appeal to the circuit court.

SEC. 8. If the owner be a minor, insane person, or shall reside out of the county where such land may be, such justice shall cause three notices to be put up within the township where such lands are situated, or the time and place of summoning such jury to make such appraisements, and if no person appears for such minor, insane person, or non-resident of the county, such justice shall appoint some disinterested person to act on behalf of such absentee, and shall then proceed as in other cases, and in all cases costs shall be awarded in the discretion of the jury.

SEC. 9. In case such company shall require for the use of said road any stone, gravel, or other material, from the land of any person adjoin

ing on or near said road, and such company cannot contract for the same with the owner thereof, such company may proceed in like manner to have the value of such materials assessed, as is above provided for assessing the value of lands; and in every such case of lands and materials such company may take possession of and use the same, immediately after having paid such justice, for the use of the owner of such land or materials, the sum, if any, which may have been assessed therefor; *Provided*, that such jury, in assessing such damages, shall not take into consideration the advantages of the road to the owners of such materials.

SEC. 10. If any such road, after its completion, or any part thereof, shall be suffered to be out of repair so as to be impassable for the space of one year, unless when the same is repairing, said company shall be liable to be proceeded against by quo warranto; and if such company shall suffer the road to be out of repair to the hindrance or delay of travellers for an unreasonable length of time, they shall have no right to collect tolls thereon until the same is repaired.

SEC. 11. It shall be lawful for the directors to require payment from subscribers to the capital stock of the sums subscribed by them, at such times and in such proportions, and on such conditions as they shall see fit, under the penalty of the forfeiture of their stock, and of all previous payments thereon, or under such other penalty or forfeiture as such company may by by-law prescribe; and they shall give notice of the payments thus required, and of the time and place when and where, at least thirty days previous to the time when such payment is required to be made, in a newspaper printed in the county, or some one of the counties in which such road may be located, or if no newspaper is printed in such county, then by posting up three written or printed notices at the most conspicuous places near where the road is proposed to be located, and at the court house of said county.

SEC. 12. The shares of the corporation shall be deemed personal property, and shall be transferable in the manner prescribed by the by-laws; and any person becoming a shareholder by assignment of stock shall succeed to all the rights and liabilities of his assignor, and the directors may provide for any increase of the capital stock that they may deem advantageous to the corporation; *Provided*, the whole stock shall not exceed three thousand dollars per mile of the road.

SEC. 13. Whenever five consecutive miles of such road shall have been completed, or if the whole of such road shall be less than five miles in length, then, in such case, when the whole of such road shall be completed, the directors of such company may erect toll gates at such points and at such distances from each other as they may deem proper, and exact toll from persons traveling on the road, not exceeding the follow-

ing rates: for every sled, sleigh, carriage, or vehicle drawn by one animal, one and one half cent per mile, and for every animal in addition thereto one half cent per mile; for every horse and rider or led horse one cent per mile; for every score of sheep or swine two cents per mile; and for every score of neat cattle, mules or asses five cents per mile. Persons going to and from funerals, and soldiers of the United States or of this State, while in actual service, shall be exempt from toll.

SEC. 14. Every such company or association shall cease to be a body corporate, if within two years from the time of filing a copy of their articles of association with the county recorder they shall not have commenced the construction of their road, and expended at least ten per cent. of their capital stock, and if within four years from such time such road shall not be completed; and within six months after such road shall have been completed, the directors shall report such fact, together with the cost of its construction, to the secretary of state.

SEC. 15. Such company may make, enact, and publish any and all ordinances and by-laws which they may deem proper, not inconsistent with the laws of this state, in order to regulate the travel upon such road, and the rules to be observed by persons in meeting or passing with teams and vehicles, and all other matters which may be deemed for the welfare of such company. Any person violating any ordinance or by-law made by such company shall forfeit and pay to such company the sum of five dollars, to be sued for and collected by such company, in an action of debt before any justice of the peace of the county where the offender may be found.

SEC. 16. If any toll gatherer or gate keeper on said road shall unreasonably detain any person or passenger, after the toll has been paid or tendered, or shall demand or receive any greater toll than is by this act allowed, he shall, for every such offence, forfeit and pay a sum not exceeding ten dollars, to be recovered before any justice of the peace having jurisdiction, by the party aggrieved, within twenty days after the occurrence.

SEC. 17. If any person or persons using any part of such road shall, with intent to defraud such company, pass through any private gate or bars, or along any other ground near said road, to avoid any toll gate, or shall make any untrue statement as to the distance he or they may have traveled or intend to travel on the road, or shall practice any fraudulent means, and thereby lessen or avoid the payment of tolls, each and every person concerned in such fraudulent practice shall, for every such offence, forfeit and pay to such company the sum of three dollars, which shall be recovered in the name of such company in an action of debt before any justice of the peace of the county where the offender may be found; *Provided*, nothing herein contained shall prevent persons resid-

ing on or near the line of said road from passing thereon between the gates, about their premises, for common and ordinary business.

SEC. 18. If any agent, treasurer, toll gatherer, or other person to whose possession or custody any of the moneys of such company may come or be, shall convert any of said moneys to his own use, or make way with the same in any way, he shall be deemed guilty of embezzlement, and shall be punished upon indictment found, in the same manner and to the same extent as if he had stolen the amount so embezzled. The neglect or refusal of any such person to pay over on demand to such company or their agent any moneys in his custody or possession belonging to such company shall be deemed *prima facie* evidence that he has embezzled the same.

SEC. 19. Upon execution issued upon any judgment or decree, rendered either in favor of such company against any person or persons, or in favor of any person or persons against such company, property shall be taken and sold for the highest and best price it may bring, and without any valuation or appraisement.

SEC. 20. Such company may purchase and hold lands to the value of not exceeding one-fifth of their capital stock, over and above such lands as may be necessary in the location and construction of such road.

SEC. 21. Associations formed under the provisions of this act shall, from the time their articles are filed with the auditor aforesaid, be corporations known by the name they may assume in their articles of association, and except as in this act is otherwise provided, shall possess the general powers and be subject to the general restrictions and liabilities contained in the second article of chapter thirty-two of the Revised Statutes of 1843.

SEC. 22. The Legislature reserves the right to alter, amend, or repeal this act when it shall be deemed conducive to the public good.

SEC. 23. The directors of any company that may be formed under the provisions of this act shall be liable in their individual property for any debt that they may contract in the name of any company as aforesaid, over and above the solvent stock of any company formed as aforesaid.

SEC. 24. This act shall be deemed and taken to be a public act, and shall be liberally construed, and shall take effect and be in force from and after its passage.

CHAPTER II.

AN ACT to amend an act entitled "an act to authorize the construction of plank or coal roads," approved 16th February, 1848.

Approved, January 10, 1849.

SECTION 1. *Be it enacted by the General Assembly of the State of In-*

diana, That the act entitled "an act to authorize the construction of plank or coal roads," approved 16th February, 1848, be and the same is hereby amended as follows: First. Any five or more persons may voluntarily associate themselves together for the purpose of constructing a turnpike road; such association shall have power to construct a turnpike, or turnpike and plank road, as they may at that time deem best, and shall possess all the powers and capacities, and be entitled to all the privileges and immunities specified in said act, and shall in all things be governed thereby, except as may be otherwise herein provided. Second. The board doing county business in any county where it may be desired to construct any road contemplated in this act, or the act to which it is amendatory, is hereby authorized to permit any such association or road company to construct their road over, upon and along any state or county road in said county, and such association or road company may erect and keep up toll gates thereon, and collect tolls in the manner and to the extent provided in the act aforesaid. Third. It shall not be lawful for any such association to charge or receive any toll unless their road shall be at the time in good repair. Fourth. So much of said act as allows the board doing county business to fix the tolls of any road company, and section nine (9) of the act entitled "an act to authorize the formation of voluntary associations," approved 27th January, 1847, so far as this act, or the act to which it is amendatory is concerned, or any association formed thereunder, are hereby repealed. Fifth. The books of said company shall be prima facie evidence of the truth of the statements therein, and any member thereof shall be a competent witness to identify their books.

SEC. 2. This act, and the act to which it is amendatory, are hereby declared to be public acts, and shall be in force from and after its passage.

CHAPTER III.

AN ACT to amend an act entitled "An act authorizing the construction of plank roads."

Approved, January 16, 1850.

SECTION 1. *Be it enacted by the General Assembly of the State of Indiana*, That the first and fourteenth (1 and 14) sections of said act be and the same are hereby amended by striking out the word "Recorder" where the same occurs in each section, and inserting in the place thereof the word "Auditor."

SEC. 2. This act to be in force and take effect from and after its passage.

CHAPTER IV.

AN ACT to amend an act authorizing the construction of plank roads.

Approved, January 19, 1850.

SECTION 1. *Be it enacted by the General Assembly of the State of Indiana*, That when any company has been formed and organized in pursuance of the aforesaid act, the said company is hereby authorized and empowered to make such additions to the road, or to extend the same beyond the original limits contemplated by the company, as a majority of the stockholders shall determine.

SEC. 2. That the seventh section of the above recited act is so amended that in case the owner of any land over which such plank road be located should not be a resident of the county in which such land may be, the company may summon the agent or the owner thereof, and the same proceedings may be had against him as against the owner, and the same shall be equally binding upon the owner and upon the company.

SEC. 3. This act shall be in force from and after its passage.

CHAPTER V.

AN ACT to correct a mistake in the act relative to plank roads.

Approved, January 19, 1850.

SECTION 1. *Be it enacted by the General Assembly of the State of Indiana*, That so much of an act entitled an act to amend an act entitled an act to authorize the construction of plank or coal roads, approved Feb. 16th, 1843; approved January 10th, 1849; as repeals or modifies section nine of an act entitled an act to authorize the formation of voluntary associations, approved 27th January, 1847, is hereby declared to be a mistake, and that the true intention and meaning thereof was, and is to repeal section eight, and not section nine, to the extent therein specified, and said section eight of said last mentioned act is hereby declared to be repealed, and section nine of said act is hereby declared to be in full force, so far as the same or either of them relate to plank or coal road companies.

SEC. 2. This shall be a public act and shall be in force from and after its passage.

CHAPTER VI.

AN ACT to amend the General Plank Road law.

Approved, January 21, 1850.

SECTION 1. *Be it enacted by the General Assembly of the State of Indiana*, That the first section of an act, entitled an act, authorizing the construction of plank roads, approved January 15, 1849, be so amended as to read as follows: That any number of persons may form them-

selves into a corporation for the purpose of constructing and owning a plank, McAdamized, or gravel road, by complying with the following requirements: They shall unite in articles of association setting forth the name which they assume, the line of the route and the places to and from which it is proposed to construct the road, the amount of capital stock, and the number of shares into which it is to be divided, the names and places of residence of the subscribers, and the amount of stock taken by each shall be contained in said articles of association. Whenever the stock subscribed amounts to one thousand dollars per mile of the proposed road, copies of the articles of association shall be filed in the office of the recorder of each county through which the road is to pass.

SEC. 2. This act shall be in force from and after its passage.

ILLINOIS PLANK ROAD ACT.

AN ACT to provide for the construction of plank roads, by a general law.

In force April 13, 1849.

SECTION 1. *Be it enacted by the people of the State of Illinois, represented in the General Assembly,* Any number of persons, not less than five, may be formed into a corporation for the construction of a plank road, by complying with the following requisitions, to-wit: Notice shall be given in each county through which any plank road is intended to be constructed, of the time and place or places where books for subscribing to the stock of such road will be opened, by publication three weeks consecutively in at least one newspaper [published] in said county or counties; or if there be no newspaper published in said county, by posting up printed or written notices, for three weeks, on the door of the court-house, and on the door of the post-office nearest each terminus of the proposed road. When stock to the amount of five hundred dollars for every mile of the road intended to be constructed shall be subscribed, and five per cent. paid thereon, the subscribers may, upon due and proper notice, elect directors for the said company, not less than three in number, who shall hold their offices until others are elected. The stockholders shall severally subscribe articles of association, in which shall be set forth the name of the company, the number of years that it is to exist, which shall not exceed thirty years from the date of said article; the number of shares of which the said stock shall consist; the names of the directors first elected; the places from and to which the proposed road is to be constructed, and each township, town, or city, through which it is intended to pass, and its length, as near as it may be; the name of each subscriber, and his place of residence, and the number of shares of stock subscribed by him. Upon the filing of said articles of association, with an affidavit of at least three directors affixed thereto, that the foregoing requisitions have in good faith been complied with, in the office of the secretary of state, the subscribers of stock as aforesaid, and all persons who shall from time to time become stockholders in said

association, shall be a body corporate, and shall possess and exercise all the powers and privileges of bodies corporate.

2. A copy of any articles of association filed in pursuance of this act, with a copy of the affidavit, certified by the secretary of state, shall in all courts and places be presumptive evidence of the incorporation of said company, and of the facts therein stated.

3. Within two weeks after the formation of any company by virtue of this act, the directors thereof shall designate some place within a county, in which, according to the articles of association of such company, its road, or some part thereof, is to be constructed, as the office of said company; and shall give public notice thereof by publication in a public newspaper, published in such county, (if there be a newspaper so published,) for three successive weeks, and shall file a copy of such notice in the office of the clerk of the county court of every county in which any part of such road is to be constructed. And if the place of such office shall be changed, like notice of such change shall be published and filed as aforesaid, before it shall take place; in which notice the time of making the change shall be specified. Every notice, summons, or other paper, required by law to be served on such company, may be served by leaving the same at such office, with any person having charge thereof, at any time between nine o'clock, a. m., and noon, and between two and five o'clock, p. m., of any day, except Sundays and the fourth day of July.

4. It shall be the duty of the directors of said company to keep at their office, by the secretary, treasurer, or clerk, a book containing the names of all persons who are, or shall, within six years, have been stockholders of such company, a statement of their places of residence, the number of shares of stock held by them respectively, and the time when they respectively became the holders of stock; which book shall, in office hours, as defined in section three of this act, be open for the inspection of all persons who may desire to examine the same; and every and any person shall have the right to make extracts from such book. Such book shall be presumptive evidence of the facts therein stated, in favor of the plaintiff, in any suit or proceeding against said company, or against one or more stockholders. Every officer or agent of any company, who neglect to make any proper entry in such book, or shall neglect or refuse to exhibit the same, or allow the same to be inspected and extracts to be taken therefrom, as provided by this section, shall be deemed guilty of a misdemeanor; and for every such refusal or neglect of such officer or agent, the company shall forfeit and pay to the party injured a penalty of fifty dollars, and all the damages resulting therefrom. Every company that shall neglect to keep such book open

for inspection as aforesaid, shall forfeit the sum of fifty dollars for every day it shall so neglect; which penalty, when recovered, shall be paid into the treasury of the county, or if there be more than one, into the treasuries of the counties, in equal proportions, in which the road is constructed.

5. The shares of any company formed under this act shall be deemed personal property, and may be transferred as shall be prescribed by the by-laws of such company, but no transfer of stock shall be valid for any purpose whatever, except to render the person to whom it shall be transferred liable for the debts of such company, according to the provisions of this act, unless such transfer shall be entered on the book required to be kept as aforesaid at the office of the company; and such entry shall shew to and from whom transferred, and the date of transfer.

6. The directors of any company incorporated under this act, may require payment of the sums subscribed to the capital stock, at such times, and in such proportions, and on such conditions, as they shall see fit, under the penalty of the forfeiture of their stock, and all previous payments thereon; and they shall give notice of the payments thus required, and of the place and time when and where the same are to be made, at least thirty days previous to the payment of the same, in one newspaper printed in each county in or through which the road is located, or by sending such notice to such stockholder by mail, directed to him at his usual place of residence.

7. The business and property of each company shall be managed and conducted by a board of directors, consisting of not less than three nor more than nine, who, after the first year, shall be elected at such time and place as shall be provided by the by-laws of such corporation, and public notice shall be given of the time and place of holding such election, not less than twenty days previous thereto, in a newspaper printed in each county in or through which the road of such company may be located; or if no newspaper be published in such county, by posting up notices. The election shall be made by such of the stockholders as shall attend for that purpose, either in person or by proxy. All elections shall be by ballot, and each stockholder shall be entitled to as many votes as he shall own shares of stock, and the persons having the greatest number of votes shall be directors, and shall hold their offices for one year, and until others are elected. No person shall be a director unless he is a stockholder in the company, and no stockholder shall be permitted to vote at any election for directors, on any stock except such as he has owned for the thirty days next preceding the election. Whenever any vacancy shall happen in the board of directors, such vacancy shall be filled for the remainder of the year by the remaining directors.

8. Any company formed under the provisions of this act may procure,

by purchase or gift, from the owners thereof, any lands, or the right of way over any lands, necessary for the construction of the proposed road; and may also agree to the use of any part of a public highway for the construction of a plank road, with the county court of the county in which such highway may be situated. Such agreement with said court shall be in writing, and shall be filed and recorded in the office of the clerk of the said court. Before constructing the road over such land as may be acquired by gift or purchase, or over any highway by agreement with the county court, such company shall cause an accurate survey of such road, or section of road, to be made by a practical surveyor, signed by two of the directors, acknowledged by them as conveyances of real estate are required to be acknowledged, and filed in the office of the clerk of the county court.

9. Whenever said company shall be desirous of constructing a plank road over any land not acquired by them by gift, purchase, or agreement, application shall be made to the county court of the county in which such land shall be, for authority to lay out and construct such road, and to take the land necessary for such purposes; which application shall set forth the route of the proposed road as the same shall have been described in the articles of association. Public notice shall be given of such application, by publication for four successive weeks in a newspaper published in said county, if there be one published, and by posting up, for four successive weeks, a written or printed notice thereof, on the door of the court-house of said county.

10. Upon the hearing of the said application, all persons residing in said county, and all persons having any interest in any real estate through which said road is intended to be constructed, may appear and be heard. Such county court may take testimony in relation to such application, and may adjourn the hearing from time to time, in its discretion.

11. The county court, if such an application be granted, shall appoint three persons, having no interest in the stock of the proposed road, nor in the lane over which said road is intended to be constructed, as commissioners to lay out said road. If such company shall intend to construct its road continuously in or through more than one county, three commissioners shall be appointed by the county court of each county, and the joint commissioners so appointed shall lay out the whole route. The said commissioners, after taking an oath justly, and fairly, and impartially to perform their duty, shall cause an accurate survey and description to be made of such route, and of the land necessary to be taken for the construction of such road, and the necessary buildings and gates; which survey shall be acknowledged as deeds are required to be acknowledged and filed in the office of the clerk of the county court.

Where joint commissioners act, appointed by different counties, they shall make a separate survey for each county, to be acknowledged, and filed as aforesaid. The commissioners appointed by each county court, shall at the same time assess the damages which each owner or owners of land in their respective counties will sustain, over and above the additional value which such lands will derive from the construction of the road, and make a report thereof in writing, signed by a majority of the commissioners, to the county court appointing them. The said commissioners shall hear all persons interested, who shall apply to them to be heard. The company shall pay each of said commissioners two dollars for every day spent by him in the performance of his duties, and his necessary expenses.

12. No road shall be laid out through any orchard, to the injury or destruction of fruit trees, or through any garden, nor through any dwelling house, or buildings connected therewith, or any yards or enclosures necessary for the use and enjoyment of such dwelling, without the consent of the owner; nor shall any such company bridge any stream, where the same is navigable by steamboats, or in any manner that will prevent or endanger the passage of any flat-boat or raft of the width of twenty-five feet.

13. The route laid out and surveyed as aforesaid, shall be the route of said road; and such company may enter upon, and take, and hold, subject to the provisions of this act, all such lands as the said survey shall describe as necessary for the construction of such road, and the necessary buildings and gates. But before entering upon any such lands, the company shall purchase the same of the owners thereof, or pursuant to the provisions of this act, acquire the right to enter upon and hold the same.

14. If any owner of any such land shall, from any cause, be incapable of selling the same; or if such company cannot agree with such owner, for the purchase thereof; or if, after diligent inquiry, the name and residence of any such owner cannot be ascertained, the company may present to the county judge of the county in which the lands lie, a petition setting forth the grounds of the application, a description of the lands in question, and the name and residence of the owner, if known, and the means that have been taken to ascertain the name and residence of such owner, if unknown, and praying that the damages of the owner of the lands described in the petition may be ascertained.

15. Upon receiving such petition, the said judge shall appoint a time, at some regular or special term of the county court, for the hearing of the petition. At least ten days' notice of the time and hearing of the petition, shall be served personally upon each owner of the lands described in the petition, if he reside in the state of Illinois; and such

notice shall be served on all other owners in like manner, or by publication thereof, for four successive weeks, in some newspaper published in the county in which the lands lie; or if there are none published in such county, then in the nearest newspaper; the first of which publications shall be sixty days before the hearing.

16. At the time appointed for the hearing, if the assessment of damages reported by the commissioners be objected to by either party, by the consent of both parties, or those legally authorised to represent them, the county court shall assess and determine the damages which the owner of any lands will sustain, over and above the value the owner will derive from the building of the road. The court shall, in such assessment, hear any competent testimony either party may present, and shall have power, upon cause shewn, to adjourn the hearing from time to time. The court shall, at the time of making the assessment of damages, also determine the amount that ought to be paid to the owner for the time spent and necessary expenses incurred by him in respect to the proceedings to determine the damages; which shall be paid by the company. The assessment of the court, which shall contain the name of the owner and an accurate description of the lands to be taken, shall be entered of record, and such assessment shall be final.

17. At the time appointed for [the] hearing before the county court, if the assessment of damages reported by the commissioners be objected to by either party, and a trial by jury demanded; or if there be no person legally authorised to act for the owner, it shall be so entered of record in the county court, and such entry, with a copy of the application, shall be certified by the clerk of the county court, and filed by him in the office of the clerk of the circuit court, who shall docket the same.

18. Such case shall stand for trial in its order on the docket, at the term of the circuit court next after the filing of the papers by the county clerk as aforesaid; if the owner appears in person or by attorney, or if satisfactory evidence be furnished to the court by affidavit, or the return of a sworn officer, that notice of the time and place of the hearing of the petition before the county court had been served upon the owners personally or by publication, as provided in section fifteen of this act.

19. In case any lands described in the petition shall be owned by any married woman, infant, idiot, or insane person, or by a non-resident of the state, and no person legally authorised to represent him, her, or them, shall appear, the circuit court shall appoint some competent and suitable person, having no interest adverse to the owner, to take care of the said owner's interest in the proceedings to assess damages to be paid to the owner. And all such notices as in the further progress of the case are required to be served on any owner, shall be served in like manner on

the person so appointed, but any person so appointed may at any time be superseded by the owner.

20. Cases of assessment of damages, except so far as is otherwise provided by this act, shall be conducted in the circuit court, according to the rules of practice of said court, so far as such rules are applicable. The jury, after hearing the evidence, and the parties, shall, by a verdict, ascertain and determine the damages which the owner of any lands will sustain over and above the value the owner will derive from the construction of the road, and also the amount that ought to be paid to him for the time spent and the necessary expenses incurred by him in the proceeding to assess damages, to be paid by the company. Such verdict shall be in writing, signed by the jury, and shall contain a particular description of the land in respect to which it is found, and be entered of record. The court may, in its discretion, on the application of the company, direct two or more similar cases standing for trial at the same term, to be submitted to the same jury.

21. Within thirty days after the rendition of any such verdict, or if a new trial be granted, or an appeal taken, within thirty days after the final trial, or decision in the appellate court, or within thirty days after the assessment of damages by the county court, if made by that court, the company shall pay to the person entitled to receive the same, the amount awarded by the county court, if tried by consent by that court, or awarded by the jury if tried in the circuit court, or shall make a legal tender thereof to him; and the company may thereupon enter upon the lands in respect to which an assessment of damages has been made, and take and hold the same so long as it shall be used for the purposes of such a road as such company was formed to construct.

22. If any person be not a resident of this state, or cannot be found therein after diligent search, the company may furnish to the county judge satisfactory proof, by affidavit, of such fact, and he shall thereupon make an order, that the amount to be paid to the owner shall be deposited with the county treasurer of the county in which the lands lie, for the use of the owner, and notice of such payment to be given by publication for four successive weeks in some newspaper published in said county, or if none be published in said county, in the nearest newspaper. Upon satisfactory proof being made to the judge, by affidavit, of such payment to the county treasurer, and publication, he shall make an order authorising the company to take possession of the land in respect to which the damages have been thus assessed and deposited, under which order the company may enter upon, take, and hold such land in the same manner, and with the same effect, as if payment had been made to the owner personally. The orders and affidavits made under this section shall be filed in the office of the clerk of the county court.

23. Every plank road made by virtue of this act, shall be so constructed as to make a secure and permanent road, the track of which shall be made of plank, and in such manner as to permit wagons and other vehicles conveniently and easily to pass each other, and also so as to permit all vehicles to pass on and off where such road is intersected by other roads.

24. In each county of this state, in which there shall be any plank road constructed by virtue of this act, the county court shall appoint three inspectors of such roads, who shall not be interested in any plank road, and who shall hold their offices during the pleasure of the court. Before entering on their duties they shall take an oath faithfully to perform the duties of their office, and file the same in the office of the clerk of the county court.

25. Whenever any such company shall have completed their road, or any two consecutive miles thereof, application may be made to any two of the inspectors, to be appointed as aforesaid by the court of the county in which the road, or the part thereof to be inspected, is constructed, to inspect the same; which inspectors shall be allowed two dollars per day for the time necessarily employed, to be paid by the company whose road they inspect; and if they find that the road so inspected, or two or more miles thereof, is constructed according to the true intent and meaning of this act, and is fit for use, they shall sign a certificate to that effect.

26. Upon filing a certificate as aforesaid of the inspectors, or two of them, in the office of the clerk of the county court, the company may erect one or more toll-gates upon the road, and may demand and receive toll, not exceeding the following rates: For every vehicle drawn by one animal, two cents per mile; for every vehicle drawn by two animals, three cents a mile; for every vehicle drawn by more than two animals, three cents a mile, and one half cent additional a mile for every animal more than two; for every ten of neat cattle, one cent a mile; for every ten of sheep or swine, one cent a mile; and for every horse and rider, or led horse, one cent per mile.

27. The stockholders of every company incorporated under this act, shall be liable in their individual capacity for the payment of the debts of such company, for an amount equal to the amount of stock they severally have subscribed or hold in said company over and above such stock, to be recovered of the stockholder who is such when the debt is contracted, or of any subsequent stockholder; and any stockholder who may have paid any demand against such company, either voluntarily, or by compulsion, shall have a right to resort to the rest of the stockholders liable, for contribution. The dissolution of any company shall not re-

lease or affect the liability of any stockholder, which may have been incurred before such dissolution.

28. The debts and liabilities of any company formed under this act shall not exceed in amount, at any one time, fifty per cent. of the amount of its capital actually paid in; and if such debts and liabilities shall at any time exceed such amount, the stockholders who were such at the time any excess of debts or liabilities shall be created or incurred, shall be jointly and severally individually liable for such excess, in addition to their other individual liability as provided in this act.

29. In any action against any company formed under the provisions of this act, the plaintiff may include as defendants any one or more of the stockholders of such company, who shall by virtue of the provisions of this act, be claimed to be liable to contribute to the payment of the plaintiff's claim; and if judgment be given against such company, in favor of the plaintiff, for his claim, or any part thereof, and one or more stockholders so made defendants shall be found to be liable as aforesaid judgment shall be given against him or them, and shall shew the extent of his or their liabilities individually. The execution upon such judgment shall direct the collection of the sum for which it may be issued, of the property of such company liable to be levied upon by virtue thereof; and in case such property sufficient to satisfy the same cannot be found, that the deficiency, or so much thereof as the stockholders who shall be defendants in such judgment shall be liable to pay, shall be collected of the property of such stockholders respectively. And if in any such action any one or more of such stockholders shall be found not to be liable for the demand of the plaintiff, or any part thereof, judgment shall be given for the stockholders so found not to be liable, but no verdict or judgment in favor of any such stockholders shall prevent the plaintiff in such action from proceeding therein against the company alone, or against the company and such defendants who are stockholders as shall be liable for such demand, or some portion thereof. Suits may be brought against one or more stockholders who are claimed to be liable for any debt owing by the company, or any part of such debt, without joining the company in such suit, but no such suit shall be so brought, until judgment on the demand shall have been obtained against the company, and execution thereon returned unsatisfied in whole or in part, or the company shall have been dissolved, and in such suit there may be a verdict and judgment in favor of any defendant not liable as aforesaid, but such verdict and judgment shall not prevent the plaintiff in such suit from proceeding therein against any defendant who shall be liable as aforesaid.

30. Where any services shall be rendered by any officer or person in the proceedings under this act, and no specific fees have been fixed by

law, the compensation to be paid by the company to any such officer or person, shall be taxed by the court under whose direction the services may have been rendered.

31. Any plank road, and its appurtenances, that may be constructed by virtue of this act, shall, for revenue purposes, be deemed real estate, and be liable as such to taxation.

32. All companies formed under this act, shall, for any violation of its provisions, to be determined by a judicial investigation, forfeit its corporate privileges. Such companies shall at all times be subject to visitation and examination by the legislature, or a committee appointed by either house thereof, or by any officer or agent in pursuance of law.

33. Every company incorporated under this act shall cease to be a body corporate, if within two years from the filing of their articles of association they shall not have commenced the construction of their road, and actually expended thereon at least ten per cent. of the capital stock of such company; or if within five years from such filing of the articles of association such road shall not be completed according to the provisions of this act.

34. The county court of any county is hereby authorised to subscribe to the stock of any plank road lying in said county, to an amount not exceeding one-third of said stock, and such county shall be subject to all the liabilities and have all the rights of a stockholder, as provided by this act.

JUDGE GRIDLEY'S OPINION.

SUPREME COURT OF NEW YORK—JEFFERSON GENERAL TERM.

A PLANK ROAD REMAINS A PUBLIC HIGHWAY, IF LOCATED ON AN OLD ROAD. DAMAGES INCURRED BY GRADING CANNOT BE RECOVERED BY AN INDIVIDUAL.

Benedict vs. Goit. Kirkland for the Plaintiff. Comstock for the Defendant. Gridley, Justice.

The questions raised upon the demurrer in this cause involve the constitutionality of one of the provisions of the act organizing the "Rome and Oswego Road Company," and authorizing the construction of the road known as the plank road, leading from Rome to Oswego. By the second section of the act (laws of 1844, p. 434) the provisions of the general statute concerning turnpike corporations, (1 R. S. 581) are adopted, and made applicable to the road in question. The 29th section of the general act confers the power of taking any public highway, by appraising the value of the public interest in the road, and paying the same to the commissioners of highways, to be by them applied to the improvement of the roads in their respective towns. It is this particular provision to which the plaintiff objects. He lives upon the line of the road which has been constructed upon the site of a public highway that has been appropriated under this section; and he complains that the defendant has committed an unwarrantable trespass upon his land by the act of building the road—and also that in grading it an embankment has been raised in the front of his dwelling house, so that he has been compelled to incur considerable expense and inconvenience in raising his buildings to the level of the road. The defendant has in his plea justified the alleged trespass, under the act, as a servant of the company, and to this plea the plaintiff has demurred.

The ground assumed by the plaintiff is that the "*locus in quo*," since its appropriation by the company, has ceased to be a public highway, and therefore that the entire interest in it has reverted to him as the original owner; and doubtless the conclusion follows as a legal conse-

quence if the premises are admitted to be correct. Several cases have been decided in this state, holding that rail road companies, which have occupied portions of the public highway, are liable to the owners of the soil for an unlawful invasion of their rights. (3 Hill 567; 25 Wendell 462; 5 Hill 170.) But a rail road is in no sense a public highway. The nature of the road forbids its use by the public in common with the company. But the position assumed by the defendant's counsel is that the road in question in this suit is a *public highway still*, open for the public use, precisely as is every public road in the state; and that the corporations organized by the act before cited has succeeded to all the rights and powers of the commissioners of highways, in the several towns through which the road passes. We are of this opinion.

I. That the road is public in the sense that every citizen has the right to travel on it, either on foot, or horseback, in his carriage, or with his team, subject to the payment of the legal tolls, is undeniable. The object of the legislature in passing the act seems to have been two-fold: 1st. To provide for a better road than is ordinarily constructed under the supervision of the town commissioners. In order to carry out this design, the sixth section of the act declares that the "track of said road shall be constructed of timber, plank, gravel, or other hard material, so that the same shall form a hard, smooth and even surface." It cannot be doubted that the legislature has the power to ordain by law that all the public highways in the state shall be graded, leveled, and constructed of some hard substance, under the direction of the town commissioners, so as to form a hard, smooth and even surface. And it is equally clear that the commissioners in the respective towns, by virtue of the powers they now possess, may in their discretion improve the public highways in all these respects to the extent of the means under their control. No importance should be attached to the idea of a plank road; for the intent of the act was simply to provide for a road constructed of some hard and durable material. A gravel road would equally have satisfied the requirements of the act.

2d. A further object of the legislature was to provide for a different mode of keeping the road in repair. It devolves the *duty* upon the corporation instead of the town commissioners, and provides for raising the *necessary funds* by levying tolls on those who travel on the road, instead of resorting to an assessment upon the inhabitants of the respective districts. We do not see why these provisions are not entirely within the power of the legislature. May they not vest the oversight of the public roads in any other agent than the commissioners? And may they not provide any other mode which seems to them more equitable and expedient for keeping the roads in repair, than the ordinary highway assessment? And if these provisions should be extended to all the public

highways in the state, would they cease to be *public highways*? And would the public interest in the roads become forfeited by such an act, and the owners of the fee of the lands over which the roads are constructed, succeed to their original estate in those lands, discharged of the right of the public to use them as public highways? We think not. And if this consequence would not follow from a general exercise of this power by the legislature, we do not see why it should in the particular instances in question. To deny the power of the legislature to exercise this extensive control over the public highways in the state, would be to interpose an effectual barrier to any important improvement in our public roads and thoroughfares, and would operate most injuriously upon the advancement and prosperity of the commercial, manufacturing, agricultural and social interests of the community. We are of opinion, therefore, that, upon principle, the road which was taken by this company by virtue of the provisions of this act, did not cease to be a public highway; and that when the corporation paid the commissioners of highways for the public interest in the road, it succeeded to all the rights of the town commissioners to make such repairs in the road as the public interest required, whether such repairs consisted in excavations or embankments, to bring the road to a proper grade, and thus to improve its condition as a public thoroughfare.

II. This question seems to have been settled, so far as such a question can be settled by legislative authority. It is not pretended by the counsel for the plaintiff that any difference exists between the rights acquired by this corporation, and those to which a turnpike company would be entitled under the like circumstances. The provision in question has been incorporated in the acts relating to turnpike companies for more than forty years. The original turnpike act was passed in 1807, and was re-enacted in the revision of 1813, and again in 1830; and the principle was again distinctly asserted in the 26th section of the act concerning plank and turnpike roads, passed in 1847. (Laws of 1847, ch. 210, p. 216, sec. 26.) During all this period, within which the state has been traversed in every direction by turnpike roads, in the construction of which the right which is now drawn in question must have been most extensively exercised—we have no knowledge that any individual has complained of the exercise of this right, or controverted the constitutionality of the act which conferred it. This long practice under the law, in addition to its repeated re-enactment, though not conclusive, nevertheless is strong evidence in favor of the correctness of our views upon the question under consideration. : This however is not all. The point has been directly adjudicated in the case of *The Commonwealth vs. Wilkinson*, (Pickering 175.) In this case a turnpike road was adjudged to be a public highway.

It is not to be denied that the corporation have an interest, of a certain description, in the road. They may doubtless recover damages against any person who shall commit an injury upon it. This is, however, precisely the same interest which a public agent would possess in it, who should be employed under a legislative enactment to keep the road in repair, for a given compensation. Again, every citizen over whose lands a public road is laid out, retains an interest in the road. He still owns the fee of the land, and may maintain ejectment or trespass against third persons who take possession of it, or use it for any other purpose than a public highway. The public interest in the road is merely that of a right of way; and we cannot see how the interest which any individual or corporation may have in the road, that does not interfere with this right, can in any degree affect its character as a public highway. The interest which this corporation has in the road in question is entirely compatible with the use of it as a public highway, subject only to the single condition of paying tolls; and this, as we have already seen, is a burden imposed expressly for the keeping of the road in repair. And in many instances it is far more equitable than the common mode by assessment of a highway tax. By the latter mode, a citizen, whose employment consists in drawing heavy loads over a given tract of highway, in no degree indemnifies the public for the repairs which he renders necessary by the insignificant assessment which he pays in his own district. In all such cases, the system of tolls is a far more equal and just one.

III. The claim made under the 4th count of the declaration must depend upon the decision of the question we have just considered. If the corporation has succeeded to the rights and powers of the commissioners of highways, then any inconvenience or damage which the plaintiff has suffered by *proper and reasonable repairs* of the public highway is "*damnum absque injuria*." If the commissioners see fit, for the purpose of grading a highway, to cut down a hill, or to raise an embankment in the road adjacent to the premises and dwellings of citizens by which those citizens suffer expense and inconvenience, *no action can be maintained for the injury*. This question was thus settled in the case of *Graves vs. Otis*, (2 Hill 466,) where the injury complained of consisted in cutting down an eminence in a public street and sidewalk in the village of Watertown, by which the plaintiff's store was left some six or eight feet above the level of the sidewalk adjacent to the premises. (See also to the same point, 1 Pickering 418; 4 Term Rep. 794; 8 Cowen 146; Sedgwick on damages 110.)

We have not inquired whether it was necessary to allege in the plea that the value of the public interest in the road had been appraised and paid to the town commissioners, nor whether any other criticism may

be applied to the plea. But we have assumed that the acts for which the action is brought were done in the legitimate exercise of the powers conferred by the statute, and were incident to the right of constructing a road of a proper grade, and so as to form a hard, smooth and even surface, as directed by the 6th section of the act. In doing this, we have complied with the request of the counsel of both parties, their object being to obtain a decision of the important constitutional question which we have discussed. But *for any unreasonable exercise of the power conferred* by the act, the agent is responsible; and if such a case can be made out, the plaintiff should have the opportunity to amend his declaration.

The demurrer is therefore overruled, with the right to amend on payment of costs.

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